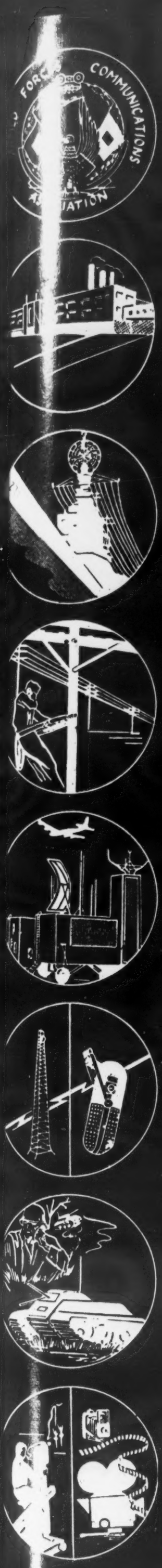
SIGNAL

Communications-Electronics-Photography



Volume AE/ 11. 11-52 Maxwell AFB, Alabama

A reflection-free faceplate, and new advances in electron optics, combine to give you TV's clearest pictures—on this new RCA 21-inch metal-shell television picture tube.

New, metal-shell television tube makes pictures more realistic!

Benefits for the TV audience were immediate when RCA, in 1949, introduced its first metal-shell picture tube. Engineered for mass production, this new tube made larger television pictures available to more people. Subsequent RCA developments in the same field have resulted in progressively better and better home receivers.

Now RCA scientists and engineers, working on principles pioneered at the David Sarnoff Research Center of RCA, have gone even further. Improved methods of focusing, based on the latest advances in the science of *electron optics,* assure more realistic images on your television picture tube.

In addition, the improved Filterglass faceplate is used as the "screen" in the new picture tube. Optically superior, this faceplate diffuses room reflections, transmits a uniformly bright image to the entire screen, and permits wider-angle viewing.

Enthusiastic reception by the industry has resulted in the use of this new tube by leading manufacturers. Be sure, when selecting a television set, to see those with the RCA metal-shell picture tube.

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See the latest in radio, television, electronics at RCA Exhibition Hall, 36 West 49th St., N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20, N. Y.

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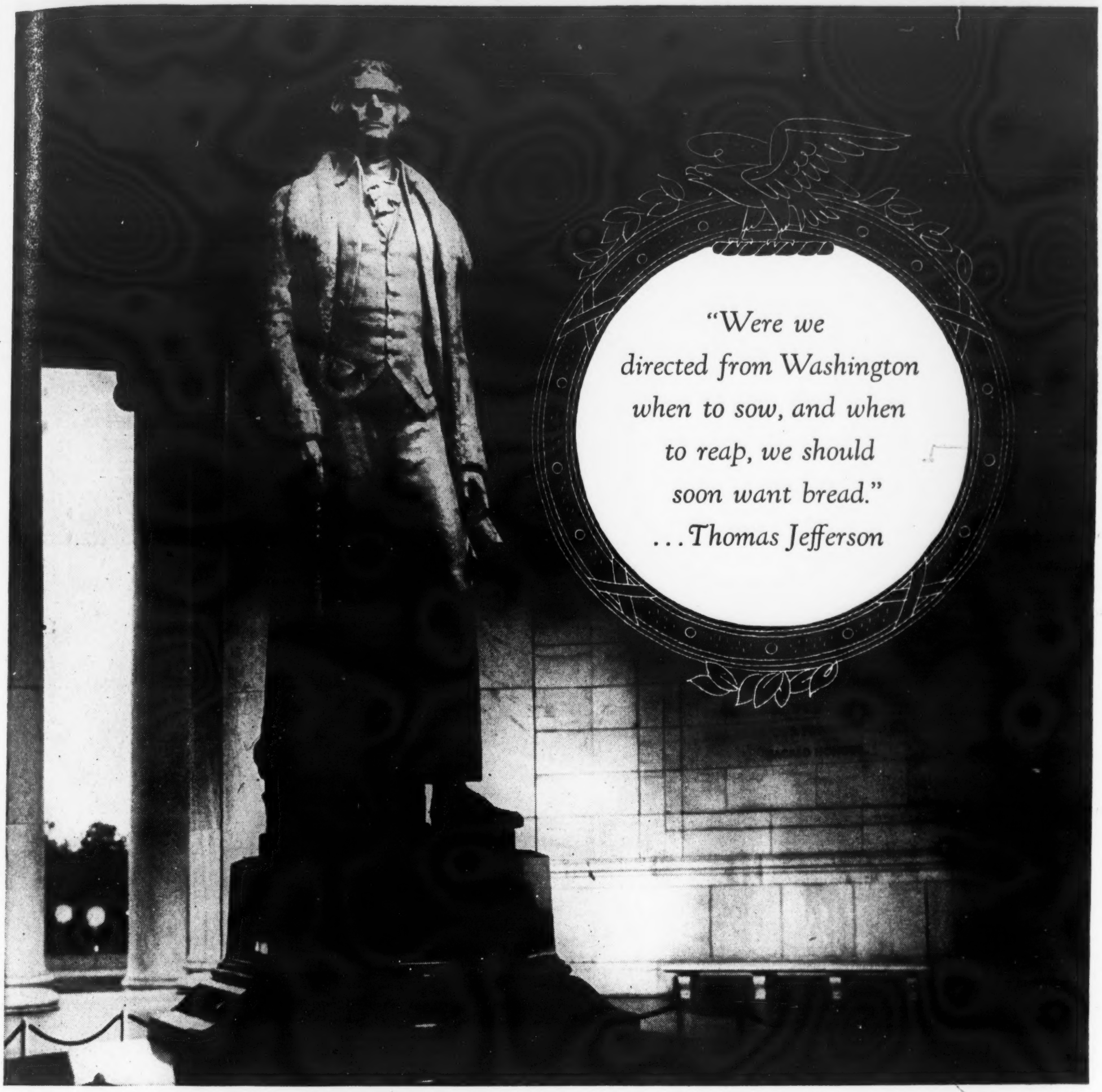

One political party, today, claims Thomas Jefferson for its very own. You hear much of this claim at the various "Jefferson-Jackson Day Dinners" this time of year.

He is, indeed, its revered philosopher. In view of this, it is well to recall what his philosophy really was, as revealed by his ever-living words, so pertinent today. He was the great foe of bureaucracy and of overcentralization. He was the implacable enemy of dishonesty in government.

His philosophy is as far from that of many of today's law-makers as white is from black. Let us revert to his principles, while there is yet time to *keep* our country great.

Walter E. Dittmar President

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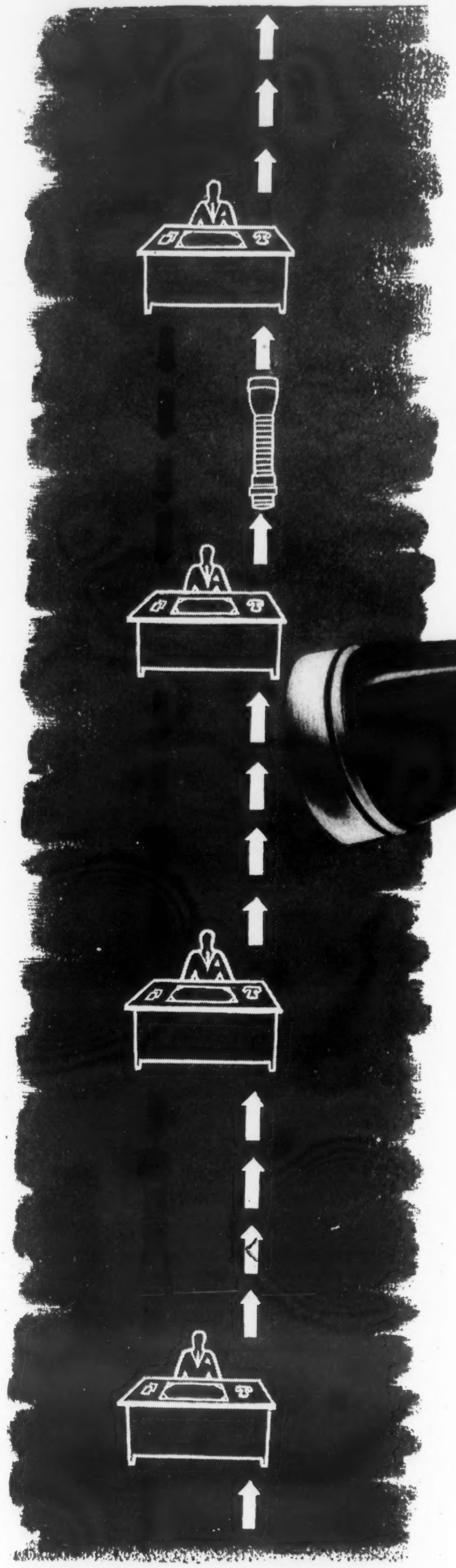

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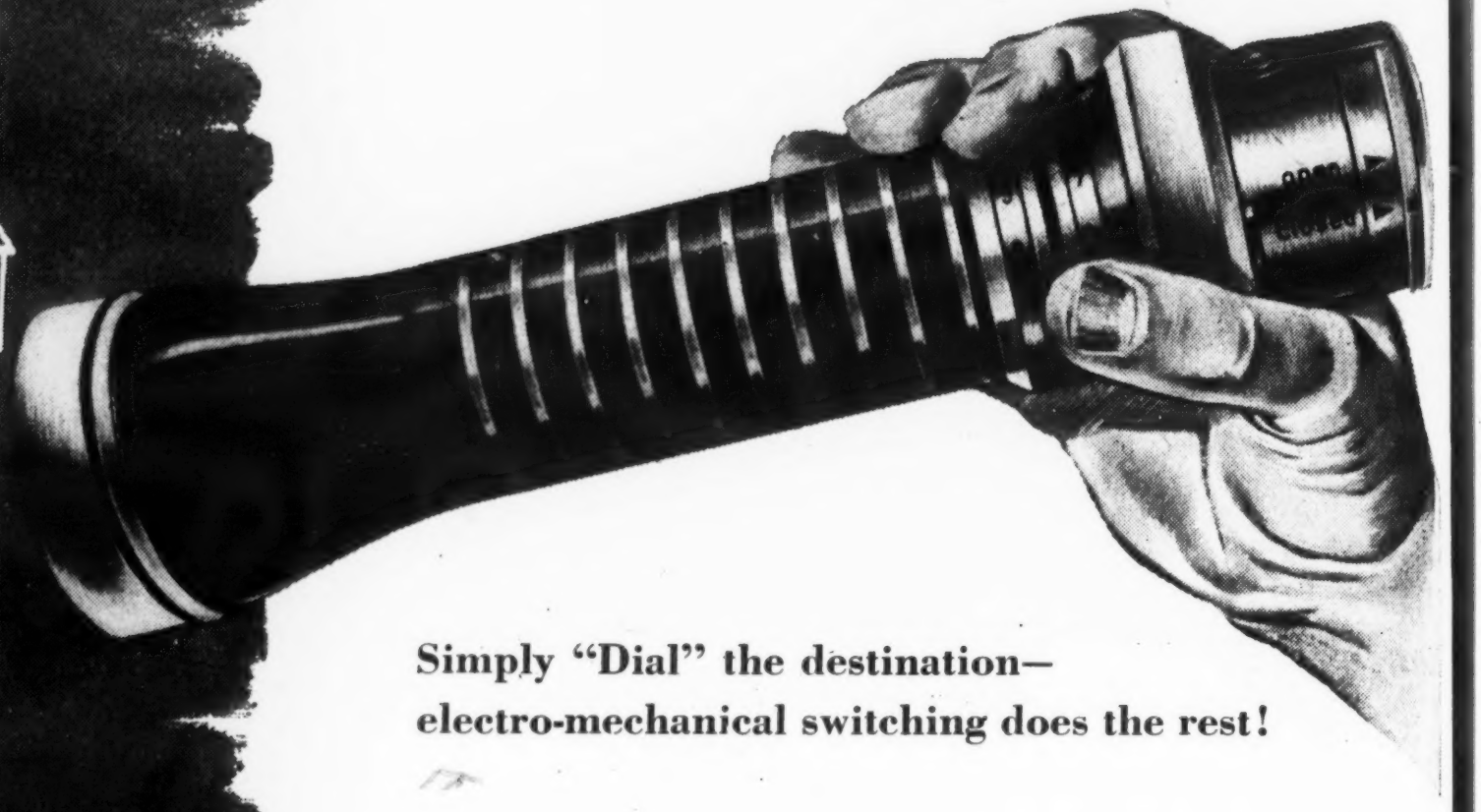

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Here is the answer to *economical, unattended, 24-hour* pneumatic tube service. Within seconds, dial-controlled "carriers" are sped from station to station—*automatically routed* by a mechanism employing the principles of modern dial telephone switching. The number of stations is virtually unlimited—and each has direct access to every other. Developed by International Telephone and Telegraph Corporation, this system is now available—for the first time—in the U.S.A.

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INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION, NEW YORK

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SIGNAL

Communications-Electronics-Photography

Journal of the Armed Forces Communications Association

VOLUME 6 | MAY-JUNE 1952 | NUMBER 5

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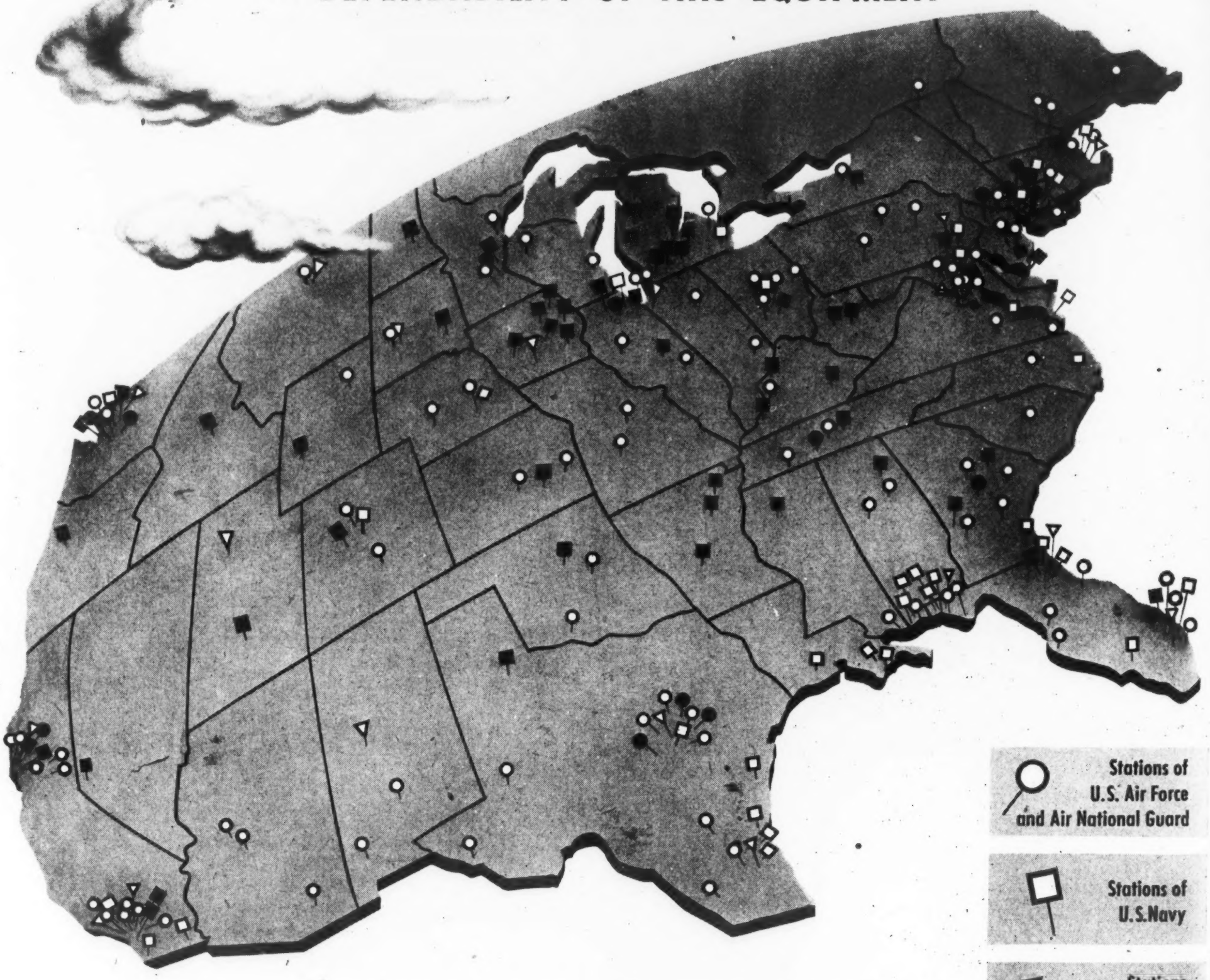
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Control desk *of electronic analog computer with two plotting tables on which the paths of the missile and target are plotted. Some of the panels containing thousands of electron tubes, in the background.*

Navy's "Electronic Brain"

Solves complex design problems in seconds

Scale model used to simulate the behavior of a guided missile under actual flight conditions.

THE world's largest and most accurate analog computer—designed and built by RCA for the U. S. Navy Air Development Center, Johnsville, Pa.—solves complex mathematical problems in a matter of seconds. The computer's "thinking" processes, which can be compared to the operation of a slide rule, employ some 4000 tubes and 600 high-speed relays.

In a typical guided missile design problem involving 250 additions, 67 multiplications, 30 integrations, and 20 aerodynamic functions, all carried on simultaneously with continuously variable factors—this giant "electronic brain" gave the solution for an infinite number of points in less than 60 seconds. A mathematician and an assistant would require 6 months to compute a solution for a required minimum number of points to give an approximate answer.

This electronic analog computer will permit the U. S. Navy to evaluate the performance of guided missiles, ships, airplanes and submarines. It is another example of RCA's research, development, applied engineering, and field service activities which are providing our armed forces, on land, sea and in the air with better military equipment.

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ENGINEERING PRODUCTS DEPARTMENT **CAMDEN, N.J.**

Anxious calls for help, reassuring words

of comfort—all have been a part of the lives of

The Doctor and the Telephone

Dr. Charles E. Birch, White Plains, N. Y., physician, with the telephone that served him for 54 years.

In the suburban community of White Plains, New York, Dr. Charles E. Birch, 88, retired last year after sixty years of practice.

Retired also was the telephone which had served him well for more than half a century. One of the old-fashioned "goosenecks," it had been installed in 1897.

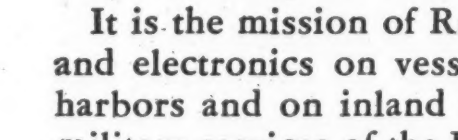
Many times over the years, the telephone company had offered Dr. Birch a more modern instrument, but he preferred to keep this old, familiar telephone on the wall.

Just one telephone — but think how many different lives have been deeply affected by the thousands of messages it carried, quickly and dependably.

And think how much your own telephone service has contributed to safer, easier and more pleasant living for you and your family.

Surely there have been times when no price could have measured its usefulness. Yet its cost is low — just a matter of a few pennies a call.

BELL TELEPHONE SYSTEM



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For more than a quarter of a century Radiomarine has been designing, manufacturing and servicing radio communications equipment and electronic navigational aids. Radiomarine's leadership in the development of radio-electronic equipment for the marine field is world known. Its products are recognized as outstanding for durability, dependability and performance.

It is the mission of Radiomarine to advance the art of radio and electronics on vessels of all kinds—on the high seas, in harbors and on inland waterways . . . to co-operate with the military services of the United States for National Defense.

The entire facilities of Radiomarine Corporation of America: personnel, technical knowledge, research and production capacity are "standing watch" ready to serve America's maritime and military needs.

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1952 AFCA

Philadelphia

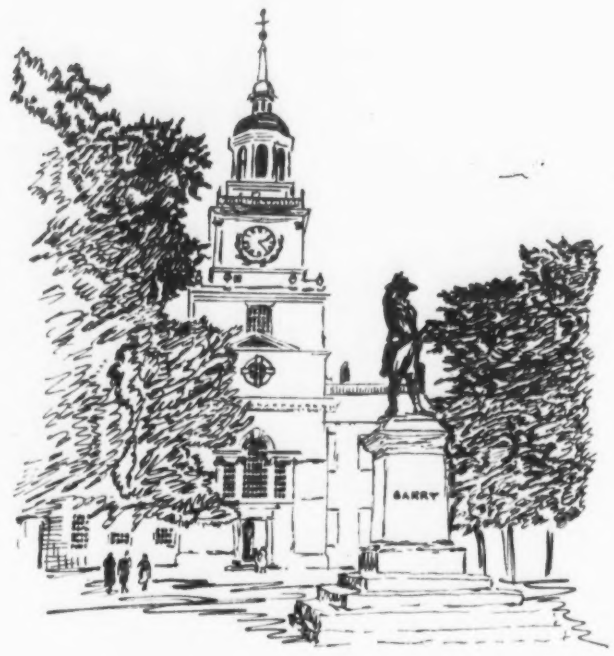
Our Nation's first Capital—a city steeped in the history and tradition of our country—a great and modern metropolis, proud of its lovely parks and beautiful museums and gigantic progress — a city like other cities, teeming with traffic, raucous with the voice of commerce—but also a city like no other.

For, turning a corner, the bustle and hurry is left behind, and you find yourself walking more leisurely along these quaint old streets. And beside you walk shadowy figures: a rather stocky individual smiles a quiet greeting, his square face, the wisest you have ever seen—Benjamin Franklin walks those streets; and there ahead strides purposefully a man with the wide-brimmed hat of the Quakers—and you recognize William Penn; and here, ascending the shallow steps of a beautiful old building are many familiar faces, for these are the members of the First Continental Congress.

This is Philadelphia—where you walk with the ghosts of men who have never died; the men who built, with careful deliberation and God-fearing conscience, the foundations of our country.

This is Philadelphia—where you can enter and touch with reverence the symbol of our Freedom, the Liberty Bell: cracked and now silent, its echoes will never be stilled.

This is Philadelphia—where one can walk and lift his head and be so terribly proud that he is an American, and know that chicanery and corruption can grow no more than the choked grass between the cobble-



stones trampled by the feet of great and honest men.

This is Philadelphia—our convention city—its tradition the greatest inspiration we could ever have.

For "the past is prologue."

6th Annual Convention

The sixth Annual Convention of the Armed Forces Communications Association is now a matter of history. It was a success from start to finish and the Philadelphia Chapter may well be proud of the job they performed as hosts to the AFCA. The business meetings covered many items of importance to the national association. The luncheon and banquet were both well attended and expeditiously handled, and both the principal speakers gave interesting talks.

The Forum, intelligently arranged and masterfully handled by Colonel J. Harry LaBrum, added a really constructive step to what the AFCA is doing to bring the Services and Industry closer together in our particular field. Open House at the Signal Procurement Agency and the Air Material Command was well attended and a great success. The show put on by the Navy at the Philadelphia Ship Yard stood out as a "first" among the many fine convention programs we have had. And the "get-acquainted" night sponsored by Philadelphia's group members of the AFCA, was an excellent idea and a most pleasant affair.

Keynote Luncheon

The Keynote Luncheon of the Sixth Annual Convention of AFCA was held on Thursday, April 24. at 12:30 P.M., in the Rose Garden of the Bellevue-Stratford. Approximately 300 members and guests attended this luncheon and listened to the excellent talk delivered by Manly Fleischmann, Director of DPA.

Mr. Fleischmann spoke on the problems of the communications-electronics industry and stated that of course they are similar to the problems of all American industry. He stated that by next year a reasonable degree of security will have been attained for this nation and we will have reached a point where aggression or attack by Russia or a satellite seems improbable. In his judgement, we will by then have an adequate arsenal of the best weapons.

Mr. Fleischmann feels that the basic problem ahead is the question of public support. Are we going to take the almost fatal step we took in 1945 when we figured that the game was all over and we could relax? It is his belief that if we take this same step after a possible truce in Korea, we

CA Convention

will again be in a completely untenable position.

The question of money for use in maintaining a substantial level of military production is another most important question, according to Mr. Fleischmann's statement. Congress has already slashed military budgets and imposed difficult restrictions on government expenditures, which is bound to slow down production for numerous industries, many of which were represented at the luncheon—even before the guns are silenced in Korea.

During the luncheon the Executive Secretary was called upon for a few remarks concerning the fine year which AFCA had just completed, and he also presented an Honorary Life Membership card to Maj. Gen. Lanahan, Chief Signal Officer of SHAPE, who was in this country on official business and attended part of the convention.

Industrial Forum

Participating in the procurement forum, at which a number of specialized questions from the floor were answered, were the following: Thomas De Nyse, Western Electric Assistant Manager of Government Contracts, who appeared for Mr. Frederick Lack when the latter could not attend because of the strike at the company's three North Carolina radio shops; Raymond S. Perry, Vice President and General Manager, Federal Telephone & Radio Corp.; R. E. Carlson, of Tung-Sol Lamp Works; L. A. Connelly, Manager of Government Equipment Sales, RCA Victor Division; Brig. Gen Wayne Allen, Procurement Division, Office of Assistant Chief of Staff of the Army; Capt. L. P. Kimball, Office of Navy Materiel; and Brig. Gen. Phil Smith, Chief of Procurement, Wright Field.

(Further detailed report on Forum—page 37)

Walter W. Watts accepts the AFCA presidency at annual banquet.

Watts AFCA President for '52

W. Walter Watts, Vice President in charge of the Engineering Products Department of the Radio Corporation of America, will be AFCA's National President for the coming year. Past President William J. Halligan, president of Hallicrafters will continue to serve as a director.

General view of the Keynote Luncheon.

DPA Administrator Manly Fleischmann, speaks at luncheon

R. E. Carlson, Tungsol, speaks at the Industrial Forum. L-R: R. S. Perry, Federal T&R; L. A. Connelly, RCA Victor; Moderator, Col. J. Harry LaBrum; Gen. Wayne Allen, G4; Gen. Phillip Smith, USAF; Capt. L. P. Kimball, USN.

Council and Directors Meeting

The meeting of the Council and Directors was presided over by National President William J. Halligan, with a total of ten directors and 31 additional council members present.

The Executive Secretary submitted his annual report on the condition of the association and offered certain recommendations for improvement the following year.

Action by the group resulted in changing the number of members of the Executive Committee from 7 to 9; in reducing the student membership

• Executive Secty. G. P. Dixon speaking at Council & Directors meeting.

dues; in changing the allocation of large-group membership dues to the chapters; and in election of the following directors and officers whose names had been presented by the Nominating Committee headed by George Bailey:

Directors elected to serve until 1956 are: Rear Adm. Wm. B. Ammon, Maj. Gen. George I. Back, Theodore S. Gary, F. R. Kappel, J . Harry LaBrum. Maj. Gen. Raymond C. Maude, David Sarnoff, and W. Walter Watts.

Elected to fill three vacancies in the class of 1953, were Harry E. Austin, Harry A. Ehle and Frank W. Wozencraft.

Officers elected for the 1952-53 fiscal year, are: W. Walter Watts, vice president of RCA-Victor, president; vice presidents, Maj. Gen. George I. Back, Chief Signal Officer of the Army; Rear Adm. Wm. B. Ammon, Director of Naval Communications; Maj. Gen. R. C. Maude, Director of Air

• Upper left: George H. Goldstone and C. T. Jeffers, Detroit, discuss chapter activities with Chapters Secretary Julia B. Godfrey.

• Lower left: Chapter Presidents met with Colonel G. P. Dixon and 1952's president Walter W. Watts.

Force Communications; Vernon B. Bagnall, Gen. Mgr. Western Area LL Dept., A. T. & T.; Ellery W. Stone, president, American Cable & Radio Corp. and counsel, Frank W. Wozencraft.

The invitation by Maj. Gen. R. C. Maude of the Air Force, and Paul Clark, president of the Dayton

The Industrial Forum, one of the highlights of the convention program, was well attended.

Get-Acquainted Night at the convention brought members together for a pleasant buffet.

Wright AFCA Chapter, to hold the 1953 Air Force-sponsored national convention in Dayton, was accepted unanimously—the exact date to be set later.

Chapter Presidents Conference

The AFCA chapter presidents conference this year covered a great deal of ground at its meeting during the morning of April 25th. Twenty-three chapters were represented and among these were twenty chapter presidents—a remarkably good showing and the best to date.

Colonel Watts, who conducted the meeting in his capacity of national vice president in charge of chapters during the past year, opened the meeting with a statement regarding his belief that the chapters in this association are the real backbone of the organization and that the activities and interest of any given chapter are shown by its meetings, increases in membership, and the part it takes in the over-all objectives of the association in working toward the national security of our nation.

Executive Secretary Dixon reviewed briefly his annual report to the National Directors and several of the items were discussed at length in regard to their effect on the chapters. Two of the items of considerable importance were: the change in the rebate to chapters of group membership dues from $25.00 to $50.00 in connection with each of the large group members; and reduction in student dues from $3.00 to $2.00 annually.

Many of the chapter presidents brought up items which they wished to have discussed by the conference, and the final consensus was that much good came out of this meeting which will be of value not only to the individual chapters but to the association as a whole.

• General Corderman, Mrs. Ehle, General & Mrs. Allen, after the buffet.

• The buffet arrangement itself was as attractive as it was tasty.

• General Lanahan, Director of Communications for SHAPE joins Ted Gary, AFCA's 1950 president and Mrs. George P. Dixon at the buffet-get-together.

Industry "Get-Acquainted" Night

On Thursday night the Philadelphia group members sponsored a cocktail party and buffet supper that proved to be the most successful social event of any of our conventions.

Left: AFCA members touring the Signal Corps Procurement Agency in Philadelphia, signed in with receptionist Miss Finley. Right: Lt. Col. H. Norris explains the agency set-up.

There was a well-supervised bar with excellent drinks and old fashioned draft beer for those who relished it.

A long buffet served turkey and ham, a variety of salads, deserts and coffee. Tables were set for eight, ten or twelve and the informal, friendly atmosphere dispelled any feelings of "not knowing a soul"—old acquaintances greeted one another no more pleasantly than new ones. Good fellowship prevailed.

• Mrs. Ehle, Mrs. Corderman, Mr. Cohen, Mrs. Moore and Mrs. Cohen, ladies committee chairman, check over last minute plans for events scheduled the next day.

General Jim O'Connell was heard to remark that he regretted the absence of Mrs. O'Connell as he had no idea so many women attended the Convention. And numerous guests made their way to the table where General "Duke" Lanahan sat, to greet an old friend and ardent supporter of the AFCA.

There was a pianist who rendered all the old familiar tunes and many AFCA members surprised their fellows with their harmony.

• The informal evening included some group singing around the piano.

We have never heard so many complimentary remarks on a Convention affair—the Philadelphia group members and the convention committee are indeed to be congratulated on such a successful innovation.

• Banquet speaker, Hon. John R. Floberg.

Partial view of banquet crowd.

Toastmaster, J. Harry LaBrum.

Right: Lt.

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General K. B. Lawton, Norma Testardi and Colonel George P. Dixon at the cocktail party.

L-R; Col. & Mrs. G. P. Dixon; Mr. & Mrs. Ehle; John R. Floberg; Mrs. K. B. Lawton; Gen. Lawton; Mrs. Halligan and retiring pres. W. J. Halligan.

Cocktail Party

A cocktail hour preceded the annual banquet—an interlude of relaxation between the business of the day and the serious speeches to come.

Secretary John Floberg was greeted enthusiastically and his personable personal aid—Captain Jimmy Thach, were perfect guests.

Mrs. Bill Halligan (Chicago) looked beautiful in a dark blue strapless gown; Mrs. Ted Gary's Florida suntan was set off by a striking pale blue; Mrs. Art Crawford was a stunning ad for her native California designers in a pale beige taffeta; Mrs. Harry Ehle looked dramatic in Navy blue taffeta edged in delicate lace; Mrs. Kirke Lawton wore a regal, long fitted dinner dress.*

• Upper Right: C. A. House; Col. Percy Black; Ted Gary; Adm. John Redman; Mrs. Crawford; A. Crawford; Mrs. T. Gary; Adm. W. S. Anderson; Gen. F. Stoner.
• Lower right: Mrs. W. J. Halligan; Mrs. K. B. Lawton; Mrs. G. P. Dixon at cocktail party.

This cocktail hour is always a pleasant prelude to the dinner—and in Philadelphia it was a greater success than usual, thanks to the work of the Women's Committee who saw to it that introductions were made thus adding to the general atmosphere of good fellowship.

Annual Banquet

The main ballroom of the Bellevue-Stratford provided a perfect setting for the climax of the Convention. The speakers' table was decorated with magnificent centerpieces of red carnations, white snapdragons and blue iris, and on the dais at one end of the room the Navy Band was backed by a truly dramatic display of flags.

*This paragraph provided by our feminine reporter.

General James D. O'Connell speaks.

Head table view and portion of banquet crowd.

W. J. Halligan. Retiring President

1952 Chapter Of The Year Awards

At the Convention Banquet Colonel George P. Dixon presented the 1st, 2nd, 3rd, 4th and honorable mention winners with certificates. Photos below and on opposite page.

Gulf Coast's president, Colonel John McDavid accepts the Chapter of the Year certificate from Executive Secty., George P. Dixon.

Colonel G. P. Dixon presents third place certificate to Col. John Howland, president, Chicago chapter.

Below: Fourth place certificate was awarded to Rochester chapter, John Whittle, president.

The invocation was delivered by Chaplain Francis Lee Albert, Captain, USN.

Colonel J. Harry LaBrum, acting as toastmaster introduced William J. Halligan, retiring National President of the AFCA. Mr. Halligan reported on the excellent progress made by the association during his term of office.

Col. W. W. Watts the newly elected National President and other distinguished guests were called upon for a few words of greeting. Col. LaBrum then introduced the principal speaker of the evening, the Honorable John Floberg, Assistant Secretary of Navy for Air. (Mr. Floberg's speech will be published in the next issue of SIGNAL.)

Colonel Dixon presented the Chapter-of-the-Year awards, and Honorary Life Membership card and certificate to Rear Admiral Wm. B. Ammon, the new Director of Naval Communications.

Open House at Signal Procurement Agency

Colonel (now Brigadier General) W. Preston Corderman, Commanding Officer, extended greeting to the many members and guests of AFCA visiting the Signal Corps Procurement and Supply Agency. In his welcoming remarks, Col. Corderman explained that the tour was arranged so as to provide an accurate overall picture of the nature and scope of the agency's operations and the type of organization necessary to carry out the basic mission of the Signal Corps Supply Agency. Their primary mission is the supplying of signal equipment in the right quantity, of the right quality, to the right place, at the right time.

To carry out this mission, Col. Corderman explained that the agency constantly strives to obtain the best equipment from the most qualified producer, at a price which is fair both to Industry and Government, and that this can only be achieved by civilian and military teamwork.

The tour included the welcoming remarks by Col. Corderman, reports on the major operations by the various deputy officers, and a break during the program with the serving of coffee and donuts in the cafeteria, followed by a review of equipment displays, a movie "Pro Patria Vigilans" and a visit with the various Contracting Officers.

Air Materiel Command Open House

Lt. Colonel D. L. Rundquist was host to the numerous AFCA members and guests who visited this office. Explanations were provided that showed clearly the purpose of this office in Philadelphia and its relation to the overall picture of the Air Materiel Command Unit.

250 Visit Philadelphia Navy Yard

Real Admiral Rico Botta, COMNAMTCEN, welcomed the visiting members and guests of the AFCA at the luncheon at the officers club at the Navy Yard. Following a delicious luncheon, an interesting demonstration and tour was arranged. In spite of the inclement weather a large crowd of AFCA

members and their guests showed an enthusiastic interest in the Navy Air Materiel Command show.

The visitors witnessed demonstrations of a seat ejection, helicopter hovering maneuvers, an F8F catapult shot, the rescue of a dummy pilot in a fire fighting drill, and the launching of a plane into a Divi- barrier. NAMC's guests also viewed an unusual display of typical NAF and NAES development processes set up in one of the hangars. The Naval Air Development Center, Johnsville, also presented an array of special electronic equipment in the hangar.

The tour took in the parachute, paint, and sheet metal shops and the Naval Air Technical Training Unit ending with a spectacular firefighting exhibit when a newly trained crew put out the flames on a madly burning airplane in less than a minute. A dummy pilot was even rescued during the record performance.

Captain John W. King, Chief of Staff, headed the committee that arranged the tour.

Chapters awarded Honorable Mention certificates: George C. Reuhl accepted on behalf of Seattle; Col. T. R. Bartlett, N. Y. President; Col. Dixon; Louis Yack, Decatur President.

Gulf Coast—Chapter of the Year

The unprecedented chapter activities during the 1951-52 fiscal year of the association culminated at the annual banquet in Philadelphia when the 1952 Chapter of the Year title was awarded to the Gulf Coast Chapter. Col. John A. McDavid, chapter president, under whose leadership the chapter developed into one of AFCA's best units, received the certificate for first place from National Executive Secretary George Dixon.

The Kentucky Chapter won second place after a year which gave it a new record for membership and activity. John S. Lubera of Loyall, Ky., accepted the certificate on behalf of the chapter and later traveled to Lexington to present it to Col. Harold T. Gallagher, chapter president.

Third place went to the Chicago Chapter. Col. John Howland, chapter president, was awarded the certificate for third place as well as a special commendation for the chapter's industrial membership accomplishment.

Fourth place was won by the Rochester Chapter, AFCA's photographic unit. The certificate was awarded to Chapter President John Whittle.

Certificates for honorable mention were awarded to the New York, Seattle and Decatur Chapters for their excellent showings in the contest. Col. T. L. Bartlett, New York Chapter president, and Louis Yack, Decatur Chapter president, were present and received the certificates.

The interest and activities of the chapters throughout the country reached an all-time high this year, with the competition in the contest keener than ever before. In the last few months of the contest, the Gulf Coast and Kentucky Chapters were the only contenders for first place due to the large number of meetings they held. However, even if these two chapters had received no credit whatsoever for their meetings, on the basis of their membership activities alone they would still have finished first and second, respectively.

The contest rules were discussed at the chapter presidents conference at the annual convention and suggested recommendations for changes will be submitted to the Executive Committee for consideration.

John S. Lubera, Kentucky, accepts second place certificate from Colonel Dixon.

Asst. Secty of Navy for Air, John R. Floberg's speech will appear in SIGNAL July-August issue.

Executive Secty., George P. Dixon met with retiring president, W. J. Halligan and '52's president, W. W. Watts.

RADIO...UNLIMITED

IN PRODUCTION FACILITIES

Delco Radio is the world's largest builder of automobile radios—the leader in production and assembly of component parts.

IN ENGINEERING

Delco Radio developed many of the most important advances in automobile radios . . . has outstanding experience in this field.

IN QUALITY

Each and every step in the manufacturing of Delco Radio products is closely supervised to maintain high, uniform product quality.

IN MANUFACTURING CONTROL

Completely integrated for efficient production from raw material to finished product, Delco Radio meets any customer need.

Here at Delco Radio, we are keenly aware of national defense requirements and of the necessity for further accomplishment in the field of radio. Delco Radio is even now developing and producing—*on time*—superior devices that meet the test of modern military needs.

You can depend on Delco Radio for on-time delivery of products with uniformly high quality.

DELCO RADIO

DIVISION OF GENERAL MOTORS

KOKOMO, INDIANA

DOING IT THE HARD WAY

by: Lt. Col. A. K. Ransom

Today, most any bright youngster can acquire a few selected piece parts at nominal cost and assemble them into a radio frequency generator operating way up in the megacycles. Under proper conditions this device can make quite a splash in the ether and be heard 'round the world.

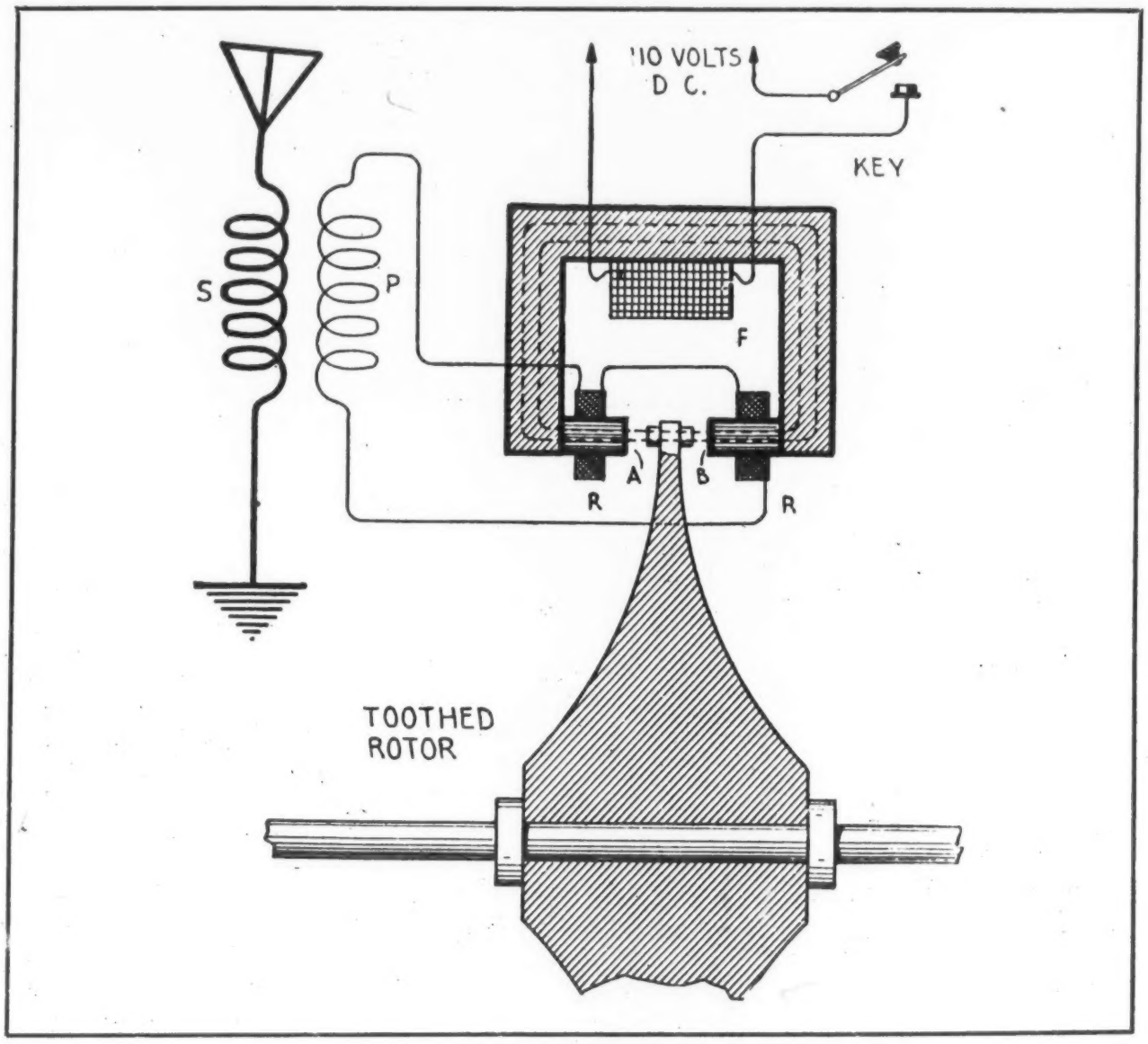
However, some thirty odd years ago, when vacuum tubes were a-borning, equipment was a bit different. One popular method of generating radio frequencies in those days is described below in the words of a then-current publication.

THE ROTO-SPANDULATOR*

A 2 K. W. alternator has been developed which generates current at a frequency of 100,000 cycles per second, the rotor of the alternator being driven at a speed of 20,000 R. P. M. In this particular type of generator, both the armature and field windings are stationary, the rotor consisting merely of a steel toothed disc. Current at 15 amperes and 130 volts is obtained from the 2 K. W. machine, which may flow directly into the antenna circuit or may be induced therein by an oscillation transformer. In the inductive method, shown in the diagram, currents of radio-frequency flow through the primary winding of the oscillation transformer P, the secondary S being connected in series with the antenna. Signalling is accomplished by placing a telegraph key in series with the field winding of the alternator or by variation of the localized inductance in the antenna circuit, as with the arc system.

In the diagram, the excitation field winding, F, consists of a single coil, wound inside the frame of the entire machine. The rotor is a toothed disc with 300 projections, the space between teeth being filled with a non-magnetic material to cut down wind friction.

The armature coils, R, R, consist each of a single turn of wire wound zigzag in slots, and any consecutive pair may be said to constitute a pair of coils of one turn each. Current is induced in the armature coils as follows: When a tooth on the rotor comes opposite the armature cores, A, B, the magnetic flux passes through windings R, R, but a minimum of flux threads through the coils, when the tooth lies between two armature coils. Thus an oscillatory current is induced in R, R, the frequency of which is determined by the speed of the rotor and the number of field poles.



*Non-Secret Short Title.

EDITOR'S NOTE: *Basically, the foregoing describes the construction and operation of the Roto-Spandulator. However, this interesting device was commonly known by the name of its inventor.*

Can you pin the correct name to the Roto-Spandulator? Drop a card to Dept. X, c/o SIGNAL, with your guess. We'll publish the tally in our next issue when Col. Ransom, curator of AFCA's Pre-Cambrian Division, presents another challenge.

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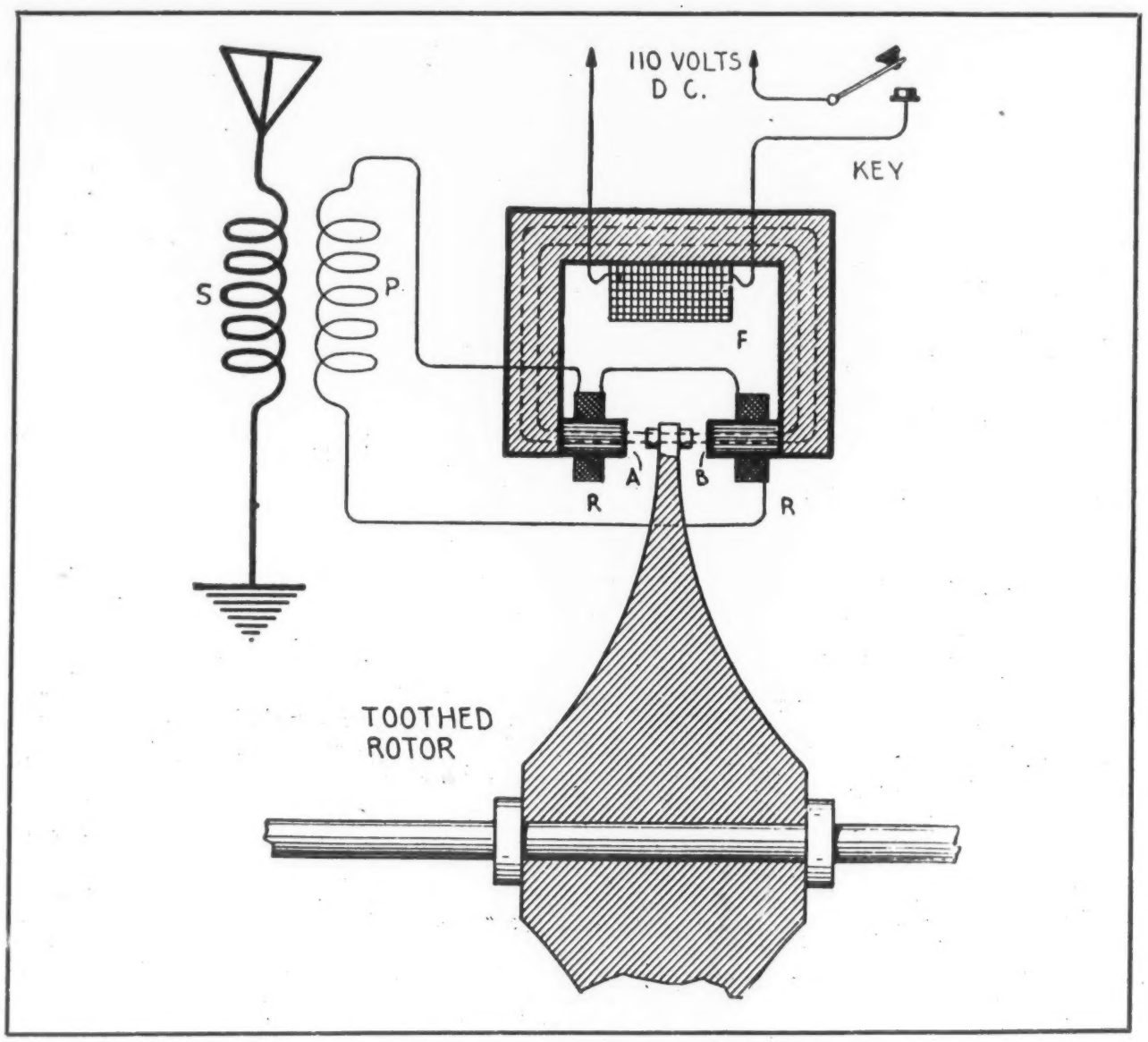

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Flak Spotters

Putting the old fashioned stereopticon to a very modern and immediate use is a full time job for a small group of specialists at a forward UN airstrip in Korea.

They are the photo interpreters who, with an adaptation of the parlor conversation piece of 50 years ago, evaluate aerial photographs of military targets in Communist-held North Korea taken from planes of the 67th Tactical Reconnaissance Wing.

"Operation Strangle," the Air Force campaign to choke off enemy supplies and re-enforcements and prevent him from building up to a major offensive during the lull in cease-fire negotiations, places a high premium on pilots being able to find and avoid Red anti-aircraft guns concentrating with murderous effect along important road and rail lines.

Sergeant James E. Kindseth is a "P.I." who specializes in spotting flak. He spends his time in a well lighted prefab building bending over a table of photos of suspected enemy gun positions.

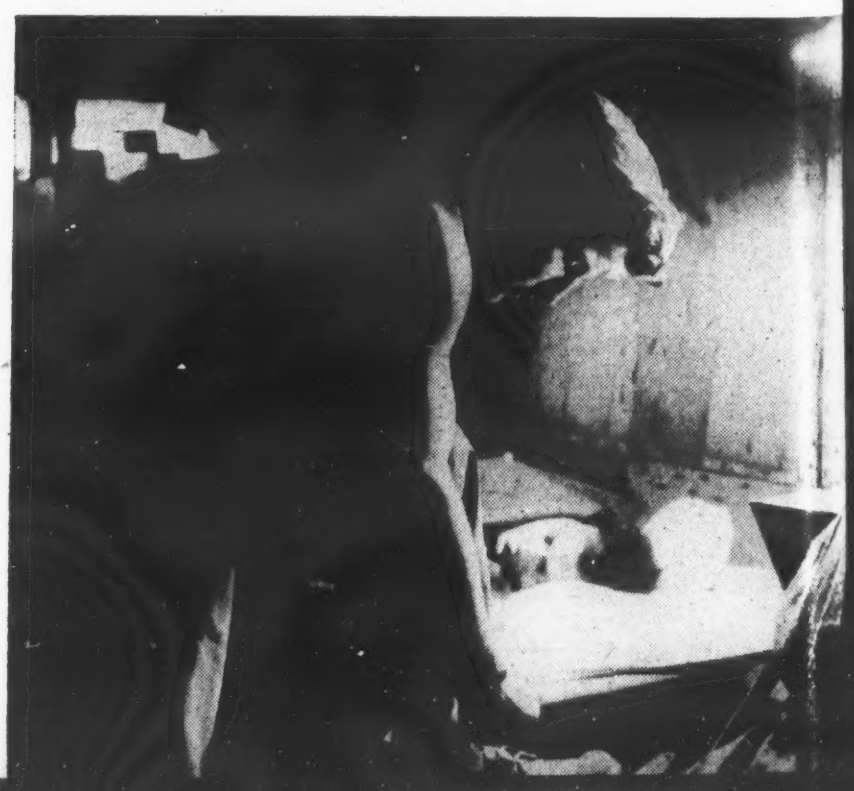
His job is to record and pinpoint all flak in North Korea, a pretty big task, even for a specialist. His reports map the locations and list the sizes and numbers of Red guns, and supply everything a pilot needs to plan an attack on important targets from the least dangerous direction. These reports are already credited with saving considerable numbers of allied aircraft from enemy ground fire.

The stereo techniques are amazingly realistic. "When you get the pictures in "Stereo," you can see right down into the canyons," Kindseth says. "Sometimes when you blink your eyes just right you imagine you see trucks moving and radar antennas whirling."

Like every other task connected with fighting a war, aerial photo interpreting goes on 24 hours a day but this little excerpt could be a "My Day" column for a photo interpreter.

An airman refuels a US Air Force RF-80 photo jet in preparation for a trip to "look-see" over North Korea, in upper photo above.

Information gleaned from night photos taken only an hour or two previously is phoned to the Joint Operations Center in lower photo. Air Force fighter or light bombers will be dispatched to take care of what these men have seen.



Right; Sgt. James Kindseth "rolls out" into a cold tent in time for his 12-8 shift. Photos taken by the 67th on a round the clock basis are often taken, processed, interpreted and delivered in a matter of hours.

LIGHTNING PROTECTION

at base communication stations

By H. C. Carmichael
Consulting Engineer

The object of this report is to indicate present-day engineering practice in the application of protective measures to minimize lightning troubles in base station radio equipment. These may operate on any frequency from 500 KC to as high as several thousand megacycles. The report supplements the lightning protection requirements of the National Electric Code. Code for Protection against lightning as approved by AIEE, and Code for Protection against lightning by the National Bureau of Standards of Washington, D. C.

It has been based also on various observations made of the lightning damage at various bases, both domestic and overseas, under various conditions, and installation, War and otherwise.

In protecting a station against the effects of lightning the fundamental problem is to provide sufficient conductivity or over-voltage protection to prevent the formation of disruptive potentials in station equipment, and to provide sufficient conductivity in the discharge path to by-pass to ground the large surge current.

The protection that may be required at any given site is dependent upon the intensity of the lightning storms experienced in that section of the world; upon the earth's resistivity, the grounding conditions.

Lightning protection required at a base station will depend upon the height of the antenna relative to that of the surrounding terrain. Doubling the height of antennas will ordinarily give 7 times the lightning strokes, averaged during the yearly period. Usually the height of the antenna towers will be such that the antenna will be exposed to more direct hits than would be experienced if the antennas were located somewhat lower than the surrounding objects. The lower antenna height, however, will be accompanied with a loss of station coverage.

To ensure satisfactory coverage, receiving antenna, and transmitting antenna are generally mounted on roof locations, wood poles, and metal towers, and/or both.

Service interruptions may result from lightning strokes which produce dielectric or other circuit failures in telephone and power circuits in the Station and Audio equipment. The lightning voltages on these circuits may be high enough to require protective measures if permanent damage is to be prevented.

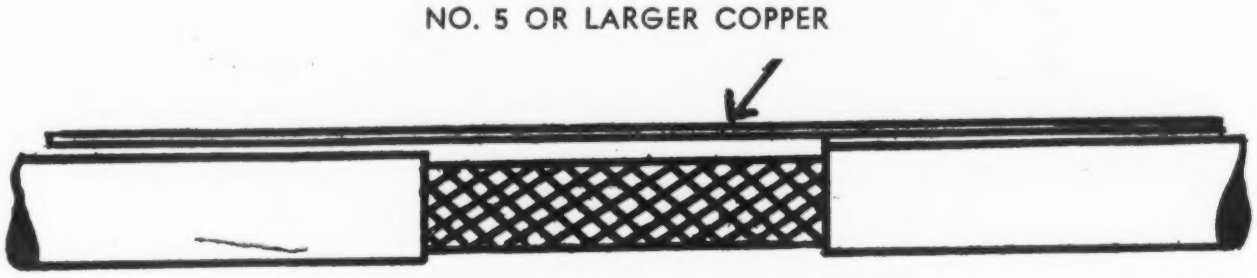
ANTENNA PROTECTION

Small antennas at base stations should have an arrangement wherein a lightning stroke can be prevented from breaking down the dielectric material in the antenna and transmission line. This protection may be in the form of a star gap at the base of the antenna or as close thereby as convenient.

The term "star gap" results from the structural shape of the toothed washer or star employed as the inner ring of the gap. When the potential difference between points of the star and the antenna skirt of housing exceeds some minimum value, the gap will break down to by-pass a large part of the lightning current to the housing which should be properly grounded.

The "star gap" has a disadvantage wherein successive strokes to the antenna will burn off the points, therefore increase the spacing between the points and the outer conductors. This affords less and less protection to base radio equipment.

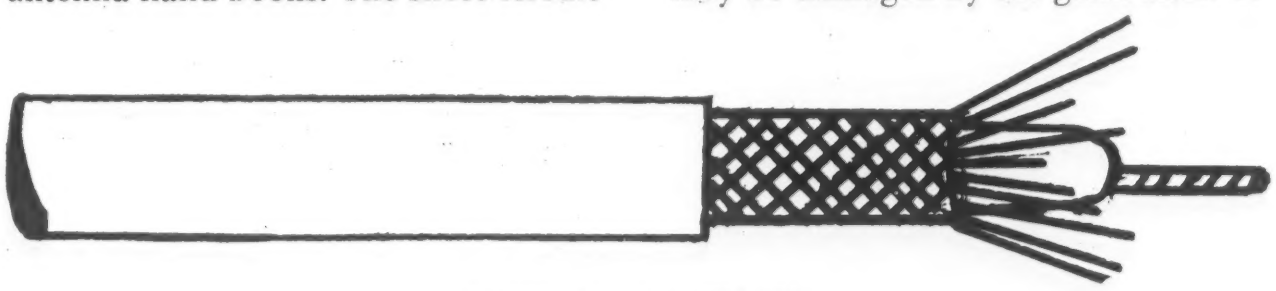
Where a star gap cannot be effectively used, a short-circuited quarter-wave stub should be added to the transmission line directly below the antenna or at the nearest point where the stub can be connected. For this point, consult one of the many antenna hand-books. The short-circuit quarter-wave stub is less effective due to its impedance not being zero, than the star gap. In locations of very severe lightning, a "J" and some other types of antenna, wherein all metal parts are firmly grounded, should be used. These require neither star gaps nor stubs. If there is no DC path to ground from the antenna, through the equipment, a suitable non-inductive resistor of 10,000 to 20,000 ohms 10-20 watts should be connected from the transmission line conductors to ground to drain off the static charges. These static charges may build up to several thousand volts in various locations, such as deserts, and dry locations. Induced lightning strokes can also build up high potentials therein. A small round ball on any point of the antenna should be used to prevent potential discharges and its accompanying severe noise at various radio frequencies, in the assorted receiving equipment.



COAX. CABLE, (Bond to shield)

Protection of Transmission Line

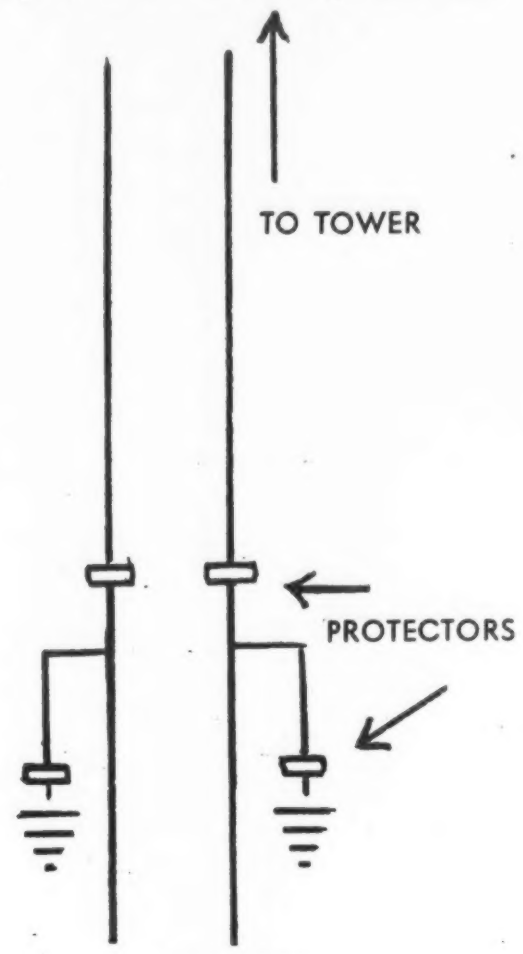
With any of the arrangements above, a lightning stroke on the antenna will result in a heavy flow of current on the outer conductor of a coaxial transmission line. In a solid dielectric coaxial line, the dielectric may be damaged by the generation of



COAX. (Bond to Shield)

COAXIAL CABLE

excessive heat. The heavy current in other tubes of coaxial lines may short-circuit the outer and inner conductors, due to the mechanical forces set up by the heavy surge current.



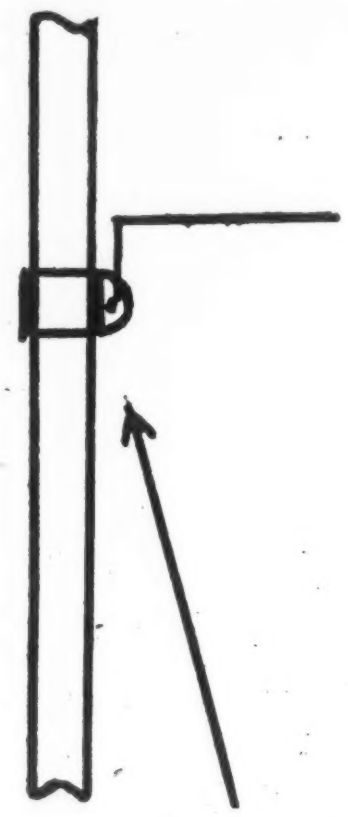
115 VOLTS

To prevent the above, a conductor should be added in parallel with the transmission line outer conductor, so as to carry the surge current. This may be on extra copper wire #6 or larger, or it may be in the form of a messenger cable for support of the coaxial line. On wood poles, a No. 6 copper wire or larger should be run between the top and bottom of the pole, on the opposite side of the pole. From the transmission line at the top of the pole the vertical paralleling wire should be connected to the outer conductor of the coaxial line and to the U-guard section. The U-guard section should extend over the top of the pole. The auxiliary parallel conductor should be extended to the ground level and interconnected there with the base station ground system.

Where the antenna is mounted on a mast beside or on top of a building in which the base station equipment is housed, grounding arrangements specified by the National Electric Code for the protection against lightning should be followed.

It may be found that the ground to which the equipment is connected is materially lower in resistance than the ground at the base of the antenna mast.

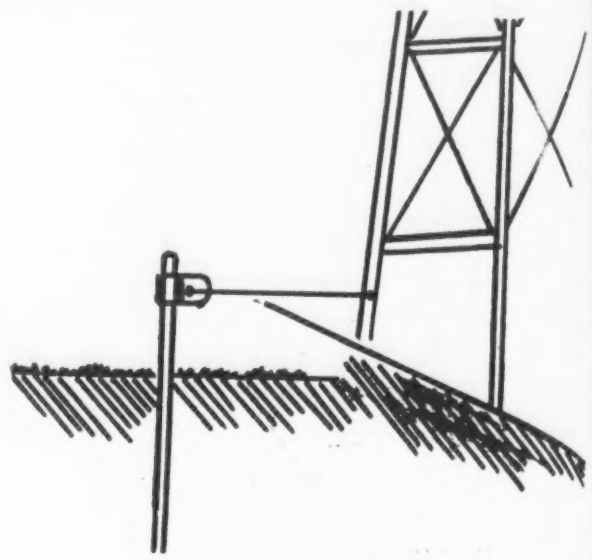
When this condition is true, and if the antenna is struck by a bolt of lightning, a large part of the surge current may be diverted to the transmission line to the building ground. This may crush and damage the transmission line. This may be prevented by enclosing the total length of the transmission line in conduit at the mast. The conduit should be bonded to the ground lead, of the mast itself if it is made of metal; inside the



WATER PIPE AND CONDUIT GROUNDS

building ground, and the outer conductor of the transmission line. It should be mentioned at this point, the application of any heat in soldering the outer conductor of a solid dielectric transmission line, may permanently damage the coaxial line. Where bond to this type of a coaxial line is required, remove 4 or 5 inches of the vinelite covering of the conductor. Lash the bond or grounding conductor firmly to the outer conductor surface, using tinned copper lashing wire. When completed, the bond should be covered with scotch electrical tape, rubber tape or other protection against the elements.

Where a metal mast is mounted on a building, it is advisable to bond the metal part of the mast to the metal part of the building, such as conduit, water pipes, etc, as well as a permanent ground. This is necessary to prevent lightning bolts from arcing from the mast to metal parts within

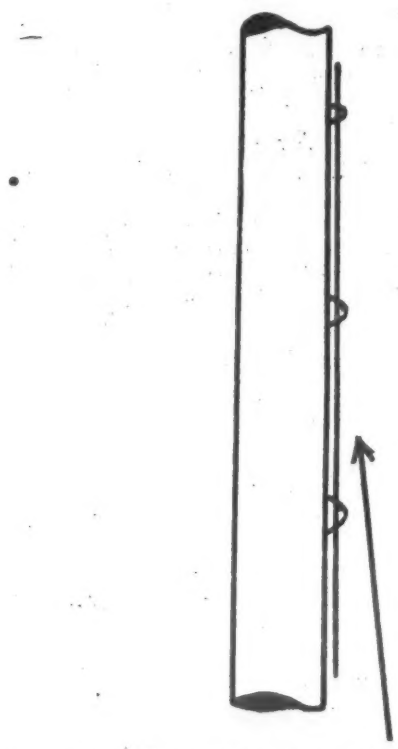


TOWER GROUNDS
Pipe 8 ft. in ground.

the building. A number 2 Copper Conductor or larger should be used for this purpose.

Protection of Marker Lights

Where masts are equipped with marker warning lights, the conduit should be bonded to the other parts of the grounded parts at the top of the mast. The metal cap of the top tower lamp fixture should be connected to the tower ground if the connection is not made through the lamp housing. If the lamp housing is grounded through threaded conduit joints, the threads may be damaged to surge currents. Another measure is to place a U-shaped protector over



PROTECTION AT WOOD POLES

the lamp housing itself. Lamp failure in the case of lightning strokes may be prevented by proper protection of station power equipment.

(Continued on page 76, col. 2)

The RANKAPHONE

by
CHRISTOPHER JAMES

An amazing possibility for a truly military communications system has suddenly appeared upon the horizon. In fact, it now only remains for Service initiative to translate its potentialities into potent combat reality.

Since the pre-historic days of smoke signals, the push-pull system of the phalanx, the big voice, pigeons, wig-wags, and lately all the modern contraptions of electronics—man has fought ever onward toward improved military communications, but the tortuous path leading to success has been strewn with obstacles because vital military requirements could not be compromised.

In the meantime, however, civilian communications have continuously blazed forward hurdling all technical and economic barriers. For five cents, or ten as the case may be, one may dial a million numbers—or talk coast-to-coast for a bit more plus tax; even phone from a moving train, or report a humiliating ichthyological saga from a fishing boat off-shore (so your wife can plan on hamburgers for dinner)—and phonovision is on the way!

Yes, very truly, civilian communications are wonderful—and the end of progress is nowhere in sight.

BUT NOT SO MILITARY—for one great obstacle has baffled and bewildered the best brains yet brought to bear on the problem.

For example, an enterprising Pfc. arranging a date through a co-operative Service Club may unknowingly tie up the circuit a General requires to issue the orders to double the size of his post or perhaps to warn of an impending cut. By the time the Pfc has arranged for his date and completed other essential, albeit unimportant conversation, it may even be too late—the General may be on his way overseas or perhaps will have reached the retirement age.

It would be wasting the reader's time (not to mention mine) should I elaborate on the obvious difference

". . . . and may unknowingly tie up the circuit a General requires. . . ."

between the requirements of civil communications and the military, since any number of staff studies have shown that, while all civilian conversations are considered equally important, the needs of the ideal military system call for the rank of the speakers to be given relative weight in the determination of who talks with whom and when—the latter being emphasized. To wit, circuit assignment must be in accordance with rank.

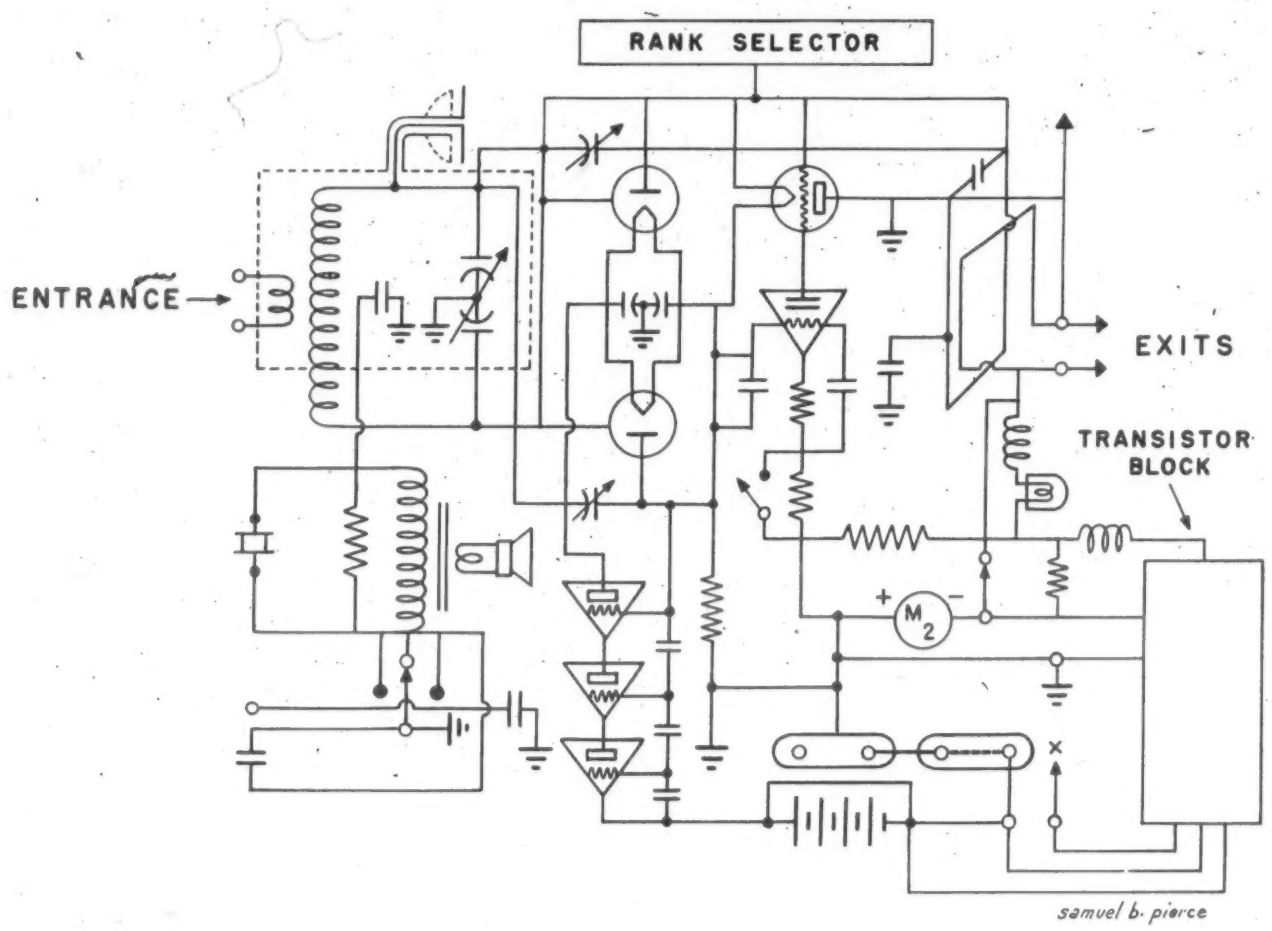
"We expect it!" say the junior officers.

"Of course!" say the higher brass.

The problem thus is only technical.

The facts remain, however, that every military situation could not possibly afford its own rank-selective manually operated switchboard; and, of course, the ordinary dial system can be no respector of rank. It is even doubtful whether a Research and Development Board top priority, supported by a plurality of cost-plus-fixed-fee joint service contracts, could correct this deficiency in a military dial exchange system. The busy signal with its impersonal and unsympathetic tone seems inherent to any automatic system(except mine), and if the busy signal is repetitive within 15 seconds, it becomes down-

(*Continued on page 74, col. 3*)



SIMPLIFIED CIRCUIT DIAGRAM OF *WACVAC*

PUBLIC RELATIONS PROBLEMS C

SPEECH BY REAR ADMIRAL
WILLIAM B. AMMON, USN
DIRECTOR, NAVAL COMMUNICATIONS
BEFORE AFCA NEW YORK CHAPTER MEETING.

I was asked to speak on the subject of "Problems of Naval Communications." After considering the various problems which we face, I decided that most of my audience is familiar with the technical problems, particularly those without security classification. Even in the case of classified matters, many of you represent organizations which are handling some phases of the problems for the Navy. Consequently, a talk along such lines would tend to be a repetition of material which is already familiar.

There is *one* problem that is a source of concern to Naval Communications. It is also one in which the Armed Forces Communications Association can be of great assistance. That is the problem of public relations.

Columnist Robert Ruark recently said that the Navy has always had its worst foot forward in public relations and always has been its own worst enemy. That is something of a left-handed compliment, and is hardly indicative of a situation that should be continued. If Naval Communications deserves a good reputation (and I believe it does) an earnest effort should be made to give it the good reputation it deserves.

In this problem there are two conflicting considerations: keeping the public sufficiently informed and maintaining adequate security.

The basic public relations tasks for the Armed Forces are: to help get to the people of this democracy the fundamental military information they must have if they are to make the decisions which will keep this nation free, and, to help create that public attitude toward the Armed Forces which is so important a factor in building top performance morale.

If the people have the information they need, they *will* make the right decisions; and if consistent public support of the Armed Forces is maintained, the Armed Forces' morale and performance *will* be markedly and favorably influenced.

Some of the things that the public should know about Naval Communications are:

that it is making effective use of the funds which the Congress provides,

that its methods and equipment result in a high state of efficiency,

that its personnel are proficient, their morale is high, and that adequate provision is being made for their welfare.

The basic reasons for having naval communcations should be made known and its specific functions should be publicized whenever security considerations permit.

In other words, the taxpayers should know where their money goes and be satisfied that its expenditure is needed.

People are also extremely interested in why and how they, or members of their families, serve in the Armed Forces. It is important that they understand that these friends or relatives are performing useful work, and that their presence in the Navy is needed and therefore justified.

On the other side of the picture is the problem of security. This matter is not quite as simple as may appear at first inspection. It is not sufficient merely to say, "this equipment is classified; we won't talk about it." There is the added danger that a collection of *unclassified* items, when pieced together, may disclose the *classified* system which they compose.

The danger of *system* disclosure is particularly severe in the case of communications. Probably material relating to every subject which affects our national security passes through a rapid communication system at some time. Consequently, a compromise of such a system might well disclose information which could cause grave damage to the nation.

The desire for complete security control of information must be balanced against certain other factors. There are many practical limitations which

NAVAL COMMUNICATIONS

hamper the attainment and maintenance of absolute protection. Consideration must be given to the fact that, under certain circumstances, progress in material development, commercial experience, and industrial capacity may be of greater value to national defense than the perfect security protection of a specific item of classified naval information.

As you can see, the problem is a complicated one; the solution is no less difficult. If your organization can supply an answer to any part of it, you will be doing the nation, and the Armed Forces, a great service.

I will mention a few approaches in the hope that they will suggest others to you.

I believe that it will be beneficial if we bring out the technical *needs* of the Services and indicate where industry and science can be of assistance. This approach should be emphasized in preference to announcement of the latest developments in Service communications. In the latter case, we lose security immediately on disclosure and gain very little in public relations.

Similarly, we can emphasize basic research and principles rather than final developments.

From the morale standpoint, personalities are more effective than technicalities. Recognition of accomplishments by Service personnel should extend down to the lowest rates, and should not be confined to senior officers. It is important for the public to know that a competent officer is in charge of a particular phase of Service communications. It is equally important for it to know that there are radiomen and technicians who are doing their share and who are equally competent. Your Association can help by extending some recognition to these Service men and women.

The Naval Communications Division recently received a request from Ohio Bell for information of this type. We are now engaged in a program to obtain action photographs and brief job descriptions of Ohio Bell employees who are on active duty with the Navy. This material is published in the Ohio Bell Magazine. It's a boost for the morale of the Service men and women to know that their friends and associates are interested in their activities.

In addition to maintaining a high state of morale among those already in communication work in the Navy, we would like to attract new personnel. The opportunities for training and experience in the fields of communications and electronics are excellent in the Navy. This is substantiated by the large numbers of our "graduates" who are now employed by industry. The Philco members of the Armed Forces Communications Association can certainly testify to this.

Women are particularly adaptable to the rates of radioman and teleman. The rate of electronics technician has not been as popular with them, but those who have entered this field have done an outstanding job.

We have one WAVE electronics technician in the Naval Communication Center in Washington. When she first reported for duty, the Officer-in-Charge said, "What am I going to do with a WAVE in that Job?" After she had been on the job for a few months he asked, "Where can I get more like her?"

If you can promote the idea of WAVES in communications and electronics, you will be not only helping the Navy, but you will be providing a valuable source of skilled personnel for civilian industry in the future. Incidentally, we'll take either short WAVES or long WAVES; they are both equally effective.

In line with the subject of morale is the desirability of making Navy communication personnel feel that they are part of a team. This is another field in which your Association can help. The Armed Forces Communications Association has done well with regard to group membership, but if the organization is to grow, it seems to me that more attention must be given to individuals, particularly those in the Armed Forces. Navy members pose a difficult problem because so few of them are stationed where they can take advantage of opportunities such as this meeting.

I hope that the Armed Forces Communications Association can, and will, give Naval Communications a hand with this problem of public relations. New ideas will be most welcome and activity along the lines I have mentioned will be very helpful. Above all, please do not place the Armed Forces in a position of competing with each other for public favor. Playing up Service differences makes spectacular headlines for the newspapers, but it hurts the Services. By judicious support, this Association can do much to promote understanding between the Services and to assure the public that the Armed Forces are pulling together on the same team.

☆ ☆

Modern Physics The Basis of Scientific Research in Engineering

by: Dr. Oleg Yadoff

Research Associate Columbia University
Visiting Prof. Manhattan College

The current years are momentous years, years of the birth of the atomic age. At such a time, it becomes specifically important that we who are witnesses of a new era review and regroup the problems which face an engineer. These problems are not simple. They are so complex that at first it is hard even to decide how they can be properly approached.

But one fact is now established. The atomic era was begun; the honor to step first on the threshold of this era fell to an American engineer. The date of July 12, 1944, is justly accepted by everybody as the birthday of the new atomic era. On this date the first experimental atomic bomb was exploded at the airdrome of Alamagordo, New Mexico. This explosion practically demonstrated the possibility of releasing a tremendous amount of atomic energy.

Perhaps with some bitterness, the engineers inevitably recognized that the atomic era advanced the physicists to first place. This new position for the physicists came as the result of the new transformation of technology and changes of unprecedented magnitude in the human way of life. They themselves did not even have to help or combat the new trend. Without physicists we obviously would not have atomic energy, but without engineers no practical application of atomic energy could have taken place. Never before has cooperation between phvsicists and engineers been more important than now.

I intend to say a few words concerning the teamwork of physicists and engineers. Perhaps these words will seem to some not so new, but even if such cooperation is accepted as feasible in colleges and universities, little is said about it, and if said it is presented in a rather vague form. Certainly physics is taught in engineering schools. It is sometimes even taught in its modern form. But it is taught as a separate subject, as a doctrine consisting of a number of laws obtained by humanity from a large number of experiments and observations. I take the audacitv to recommend to every engineer the necessity of forming an accurate philosophy of physics. When he has mastered such a philosophy, he will be able to speak with physicists in a "comprehensive tongue." The problems now standing before the physicist actually push him in the direction of creation-realization, and this brings him nearer to the engineering field. What must then be done to facilitate the desired cooperation and understanding between physicists and engineers?

First, the young engineer must be helped to unravel and understand the fundamentals of modern physics. Obviously, all that can be done in a short article is to give a general picture of the science of physics and its conceptions to provide some help for their understanding.

First let us underline the fact that physics is composed now of macrophysics and microphysics. Until very recently we knew only macrophysics. Macrophysics deals with phenomena of matter concerning a great number of atoms and molecules. The body which lies in the field of macrophysics can be visible to the naked eye, or visible only through a microscope, or it may even be an invisible microscopic particle. Macroscopic physics has its own clear and understandable problems. The problems and their solutions were based on postulates and methods of reasoning, the soundness of which was until very recently never questioned. Microphysics deals with individual corpuscles: molecules or atoms, or with their components: protons, neutrons, electrons, measatrons, photons, etc.

If microphysics were a newly formed, more or less independent section of physics, we would not have occasion to write this article. As a matter of fact, microphysics not only supplies us with a new mechanics (method) of thinking and ways of approach to new methods, but it goes much farther. It viciously attacks macrophysics, its axioms and postulates. Microphysics attempts to change the concepts and the purpose itself of physics. In general, microphysics actually undermines the very basis of macrophysics. It puts in doubt the very possibility of applying the scientific methods of thought which we were using before the appearance of microphysics.

Prior to making a review of the bases of modern physics, let us take note of the strange and peculiar development through which the ancient physics had passed until very recently. To clarify our point, let us specifically examine the theory of radiation energy. This section of physics was undergoing an impossible development. Simultaneously, two different and incompatible theories had to be applied: the wave theory and the corpuscular (or quantum) theory. Each of these theories had regions in which it explained numerous phenomena. In other regions, even in not distant ones, they were powerless to explain observable phenomena. From this seeming impasse, the science was saved by two stupendous discoveries. In 1923 an American scientist, Arthur Holly Compton, discovered a phenomenon which permitted the explanation of the transformation of energy of an electromagnetic nature into energy of a corpuscular nature. This was a first clear and indisputable example of the passing of an energy of an undulatory aspect to that of a corpuscular aspect. Compton himself has admitted that between a quantum of radiation and a free electron a collision may be produced with a certain speed, while the quantum is subjected to a reduction of energy and frequency with a change of direction. This phenomenon was called Comptom's effect. During the same year

a French scientist, Louis de Broglie, provided an explanation which now forms the basis for all atomic phenomena. According to de Broglie, all corpuscles of the Universe, in any form, remain in a state of continuous vibration. The process which ties a corpuscle of matter under all conditions with its vibration (phase wave) is called wave mechanics.

The principles of wave mechanics form the basis of the reasoning and calculations of modern microphysics. At its initial start wave mechanics followed three different paths. Schrödinger applied to wave mechanics the well known wave equation:

$$\frac{\partial^2\varphi}{\partial x^2}+\frac{\partial^2\varphi}{\partial y^2}+\frac{\partial^2\varphi}{\partial z^2}+\frac{8\pi^2 m}{h^2}[W-v(x,y,z)]\varphi=0$$

The main postulate of de Broglie can be expressed by two formulas: $W = h\upsilon$ and $\lambda = \frac{h}{mv}$, where W stands for the energy of the corpuscle, υ for the frequency of its vibration, h is Planck's constant, λ = phase wave length, and mv = the quantity of movement of the corpuscle. By substituting in the wave formula λ by de Broglie's $\lambda = \frac{h}{mv}$, Schrodinger obtained a new equation of wave mechanics:

$$\frac{\partial^2\varphi}{\partial x^2}+\frac{\partial^2\varphi}{\partial y^2}+\frac{\partial^2\varphi}{\partial z^2}+\left(\frac{2\pi}{\lambda}\right)^2\varphi=0$$

On the other hand, if W stands for the total energy of movement of the corpuscle, it must be equal to the sum of its kinetic and potential energy υ as function of x,y,z and sometimes t. But putting mv = p, we obtain

$$W=\frac{p^2}{2m}+\upsilon(x,y,z)$$

or

$$\frac{\partial^2\varphi}{\partial x^2}+\frac{\partial^2\varphi}{\partial y^2}+\frac{\partial^2\varphi}{\partial z^2}+\left(\frac{2\pi}{h}\right)^2\frac{}{mv}\varphi=0$$

Solving this equation for any particular case we obtain the amplitude of phase wave φ. The intensity of phase wave depends on the value of φ^2.

I intend to present here an example of the technical application of wave mechanics to an industrial problem. It is well known that the studies of propagation of electromagnetic waves and electric current in metallic conductors play an important role in electrotechnique.

Briefly, it is necessary to introduce in our reasoning the principles of wave mechanics. For electromagnetic fields, an application of a principle analogous to the one used for the new theory of light is appropriate. However, the introduction of photons, which are more complex than the electrons, requires the application of relativistic wave mechanics developed by P. N. Dirac. To use relativistic wave mechanics, a deeper special mathematical study is necessary. We will here then concern ourselves only with the case of electric current.

For this application, instead of corpuscles we can speak of electrons; and instead of phase waves, of electronic waves. Let us state here that the intensity φ^2 of an electronic wave can be shown easily by the phenomenon of electronic diffraction: $[\varphi_{x,y,z}]^2$ provides the probability of the electron's occupying a point with coordinates x,y,z. By the same study of electronic diffraction the wave mechanics and quantification can be verified.

In such a study we must reject the concept of a moving point. We are visualizing here not the movement of a single electron with coordinate system x,y,z but the propagation of an electronic wave φ in a system of coordinates of probabilities $[\varphi_{x,y,z}]^2$. The physical propagation of these electronic waves is hampered by the interaction of the oscillating of the atomic nuclei of the metallic conductor. P. Debye showed as long ago as 1912 that the vibration of the crystalline structure of the metallic conductor is a function of temperature and follows the law of elastic acoustic waves. These waves are thermic waves. Therefore the passage of the electronic waves is hampered by thermic waves. An interaction of these two kinds of waves takes place. The thermic waves then are what is called electric resistance. In addition to simple interaction, despite the dissimilarity of these two kinds of waves, we must expect the appearance of interference. This interference is controlled by stable states and by the constancy of electronic wave $[\varphi_{x,y,z}]^2$ = constant.

It can be said that due to the principle of quantification the different states of propagation of current are not continued, but are rather a series of discrete values such as $W_1, W_2, W_3 \ldots W_n$. If an exterior action produces a variation of the electronic waves φ, changing them to φ_0 and φ_1, a new two-fold interaction takes place which in a time interval of change t_s will transform the quantic state of energy W_0 into the quantic state of energy W_1. The temperature will then change from T_0 to T_1, and so on with every outside action.

Practically, and to a high degree, this total energy can directly inform us of the different thermal states of the metal such as $T_1, T_2, T_3, \ldots, T_n$. In this way the resistance to the passage of the electronic waves caused by the atomic beam in thermal agitation must also follow the quantification such as $R_1, R_2, R_3, \ldots, R_n$, and is susceptible to being evaluated as a function of a series of remarkable values: experiment shows that these values should be:

$R_1=k\Delta_1 T$ $R_2=k\Delta_2 T^2$ $R_3=k\Delta_3 T^3$ $R_4=k\Delta_4 T^4$ $R_5=k\Delta_5 T^5$

THE AUTHOR

Dr. Oleg Yadoff is at present a Research Associate in the Department of Civil Engineering at Columbia University. He is working on instrumentation for measuring low fluid velocities and for registering turbulence.

The author's wide range of interests and activities include studies on the influence of electric and radio-active fields in biology and bacteriology, theoretical and experimental work in electrostatics, and problems relating electricity to fluid mechanics.

Although primarily a civil engineer, Dr. Yadoff holds doctorates in both physics and mathematics, a degree in Electrical Engineering from the University of Grenoble, and other degrees from various French institutions. Well known as a consulting engineer, he taught and directed research at the Universities of Grenoble and Paris.

The author has been widely decorated for his distinguished wartime service and for his extraordinary scientific work. A Chevalier of the Legion of Honor, he has been decorated by the American, British, and French Armies. Dr. Yadoff is an honorary member of the Armed Forces Communications Association. This article was reprinted from the *Columbia Engineering Quarterly* with the author's permission.

or converting to the expressions for the conductance

$$\sigma_1 = -\frac{K}{\Delta_1 T}, \quad \sigma_2 = -\frac{K}{\Delta_2 T^2}, \quad \sigma_3 = -\frac{K}{\Delta_3 T^3}$$

$$\sigma_4 = \frac{K}{\Delta_4 T^4}, \quad \sigma_5 = \frac{K}{\Delta_5 T^5}$$

where k and K are constants which can be measured. These relations as a function of T have been discovered by different experimenters or theorists in different conditions, which justifies the probability of a discrete series. It appears that the expression for the temperature evaluated at the fifth power T^5 is a limiting case which is applicable, as will be seen later, to very low temperatures in the neighborhood of absolute zero.

Conditions of Starting and Stopping Continuous Current

$L\frac{di}{dt}+Ri = E$ corresponds to the starting of the current in a circuit. Current starts from zero and tends to its normal value. The term $L\frac{di}{dt}$ is due to E.M.F. of self induction. By integration we obtain $i = \frac{E}{R} + Ke^{-\frac{R}{L}t}$ composed of terms $\frac{E}{R}$, steady state of current, and $Ke^{-\frac{R}{L}t}$ representing the variable component of the current. The particular solution for $i = O$, $t = O$ is

$$i = i_o\left[1 + e^{-\frac{R}{L}t}\right], \text{ with } i_0 = \frac{E}{R}.$$

Then the current reaches its value i_0 after an infinite lapse of time.

For the case of interrupted current by suppression of E.M.F., starting from value i_0 at time $t = O$, we have equation $L\frac{di}{dt} + Ri = O$. The particular solution is $i_o e^{-\frac{R}{L}t}$ (Where i_o is still equal to $\frac{E}{R}$). Current will reach zero after an infinite time interval. Such an infinite time for both the first and second cases is fictitious, and the idea of extra current must be abandoned. According to our hypothesis, the time interval for establishing a current of any intensity is the well defined time t_0. It is the time required to bring about by interaction the structural modifications of the electron and thermal wave after interference, We can say that the double transformation $L\frac{di}{dt} = L\frac{d^2q}{dt^2}$. The coefficient of self induction L then of waves is equivalent to "electromagnetic inertia" = must be considered not a constant but a mean value for time $O—t_0$. In the formula for starting the current, replacing t by t_0 and L by O, we obtain $i = i_0$, which indicates full value of current at time t_0. Similarly, when current is suppressed the electromagnetic interia $L\frac{di}{dt}$ manifests itself only for definite time t_0, which corresponds (with $E = O$) to the time necessary for electronic waves to separate themselves from thermic waves and return to the initial state before interaction. When these actions are terminated, the "electromagnetic interia" does not have to persist, so $L\frac{di}{dt}$ is limited by t_0. If we will desire to assume L constant, the formula $i = i_o\left[1—e^{-\frac{R}{LE}t}\right]$ can be used with $i = i_o e^{-\frac{R}{LE}}$. If we replace L by a function L(t) existing during the time interval $O—t_o$, we can put $L(t)\frac{di}{dt} + Ri = E$ for starting the current, and from it $i = i_0\left(1-e^{-\int_o^{to}\frac{R}{L(t)}dt}\right)$, and for suppressing the current $L(t)\frac{di}{dt} + Ri = 0$; and from it $i = i_o e^{-\int_o^{t_o}\frac{R}{L(t)}dt}$, with the condition for both cases that $-R\int_o^{t_o}\frac{dt}{L(t)} = \infty$.

The equations of Schrodinger can be successfully applied to the study of the case of elastic and rigid shocks of electrons against atoms. The number of electrons scattered per second in angle $d\Omega$ is $I_n(\theta)\Omega$; n standing for the quantum state of excitation of the atoms. This is the effective differential section corresponding to the phenomenon of excitation. The integral provides the total section

$$Q_n = \int_0^{2\pi} d\varphi \int_0^{\pi} \sin\vartheta\, I_n(\theta)\, d\theta \quad .$$

The wave equation for a system atom plus electronis as follows:

$$\left[\frac{h^2}{8\pi^2 m}(\Delta_1+\Delta_2)+W+e^2\left(-\frac{1}{r_1}+\frac{1}{r_2}-\frac{1}{r_{12}}\right)\right]\varphi = 0$$

This formula is easily applicable to a spherical potential hole. A discontinuity is obtained.

$$\Delta\varphi + \frac{8\pi^2 m}{h^2}[W - {}_1]\varphi = 0$$

and

$$\Delta\varphi + \frac{8\pi^2 m}{h^2}[W - v_2]\varphi = 0$$

When scattering is produced by a potential hole with a radial field, the formula takes the form:

$$\Delta\varphi + \frac{8\pi^2 m}{h^2}[W - v(r)]\varphi = 0$$

We will stop here with our examples of the application of wave mechanics to engineering problems. We intended to show by these examples that, despite its apparent complexity, wave mechanics can be rather simply applied to different problems and that sometimes it makes the physical understanding of phenomena clearer and more precise.

Articles similar to Dr. Yadoff's are available for publication in SIGNAL. Reader interest will determine publication. Your opinion would be appreciated by the Editor.

The Story of

LORAL ELECTRONICS

Fig. 1.

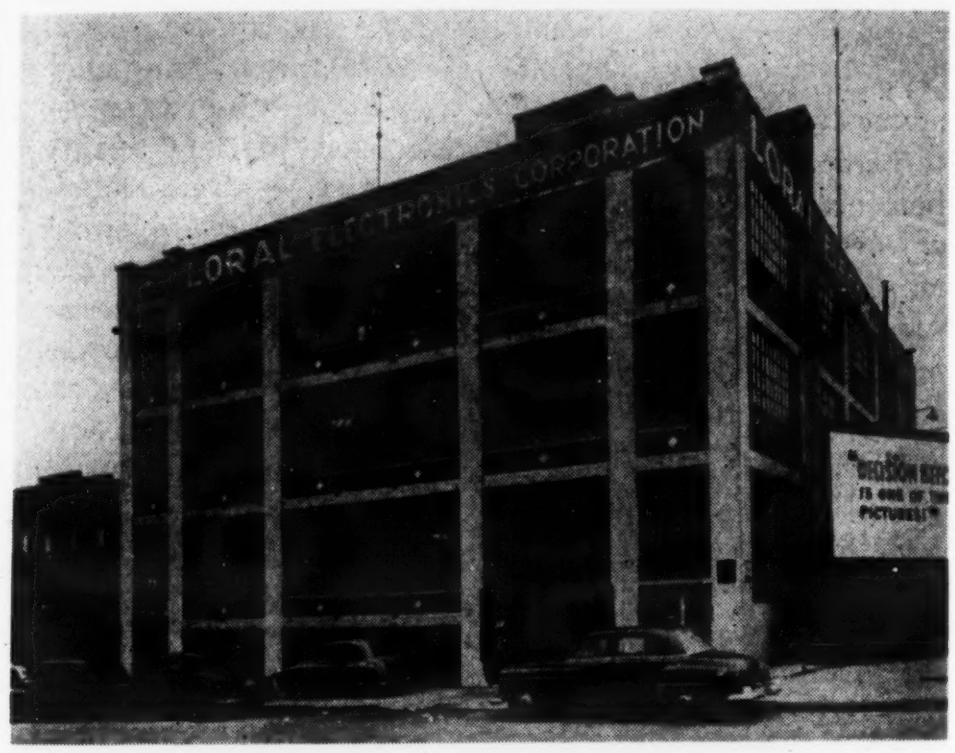
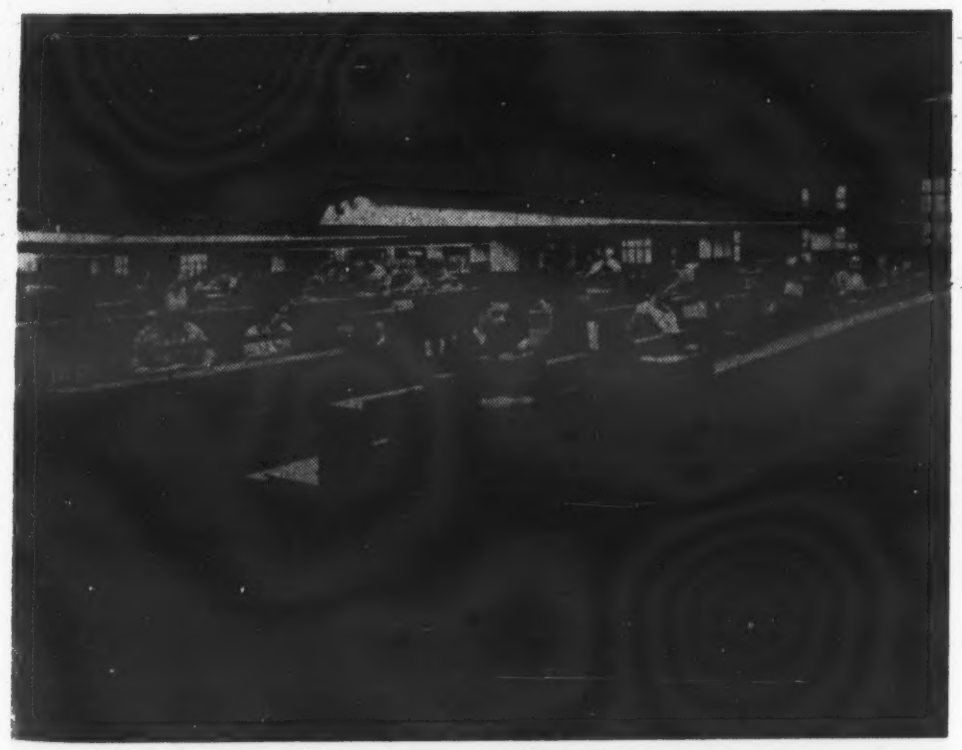


Fig. 2. Offices and laboratory of Loral Electronics.

Fig. 3. Below: Typical production floor of plant 1.



Loral Electronics Corporation, during a planned period of growth and expansion, has consistently adhered to its fundamental objectives of quality and uniqueness in electronic equipment. Loral has been guided by the maxim that the achievements of an engineering organization are based on the capabilities of its professional staff. Sparked by a nucleus of experienced engineers, original research and development have successfully culminated in the design and production of various types of navigational and radar equipment. During the present period of growth, the addition of specialists in the fields of servo-mechanisms and pulse techniques has increased the scope of development and production activities. Loral has consistently endeavored to improve the design of production equipments based on a thorough understanding of their tactical and functional requirements. Reduction of weight and volume are primary aims; the possible applications of miniaturization and potting techniques are thoroughly explored. As a result, proposals evolve which may culminate in considerably improved equipments.

The history of Loral goes back almost ten years, during which time it has functioned continuously as a complete self-contained facility for the design, development, and production of various types of electronic equipment. During World War II, the Loral organization, under its predecessor name, produced gyro-compass components, magnetometers, and servo amplifiers of various types. In recognition of the quality of its products and production efficiency, the company was awarded the Army-Navy "E".

Loral has since made steady progress in production and development facilities. At present, the engineering laboratories, model shop, and general offices are located in Plant 2, which consists of four floors containing about 50,000 square feet. (See figure 2.) The two lower floors are devoted to sheet metal production equipment, including a tool and die department, and welding and spraying equipment.

The electronic laboratory is engaged in the development of various types of equipment and serves as a proving ground for design and production prototypes.

Automatic calibration of precision frequency meters. Fig. 4.

Stockroom of plant #1.

The laboratory is fully equipped with commercial and special test apparatus for measurements in the microwave and pulse fields. The adjacent model shop complements the lab and provides an integrated electro-mechanical facility. Precision prototypes of servo components, cavities, and special devices are fabricated by skilled technicians, familiar with the unique requirements of such components.

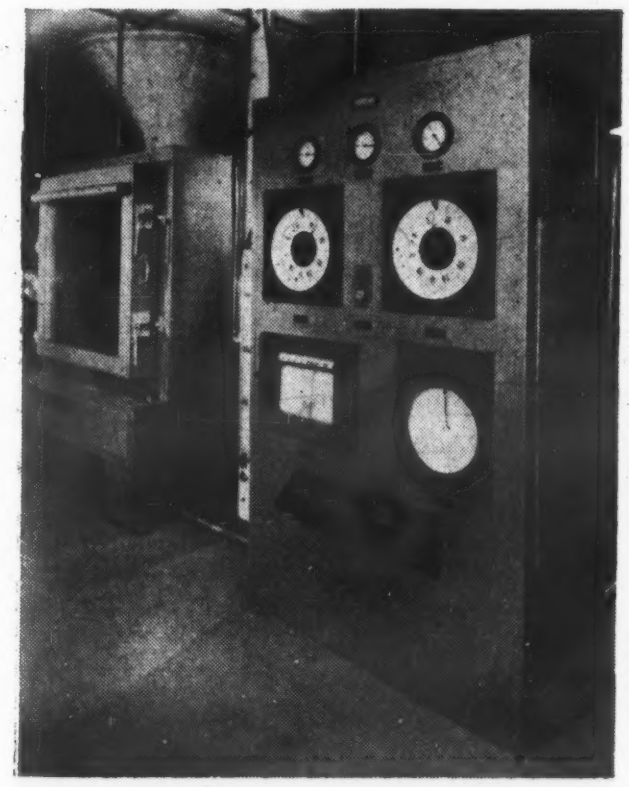
The third floor of Plant 2 contains special test equipment, for environmental testing of prototypes in accordance with AN requirements. The Bowser test chamber (see figure 3) has a capacity of 36 cubic feet; operating ranges are from —100° F to +200° F and from sea level to an altitude of 50,000 feet. Humidity may be controlled up to 100% RH, under all environmental conditions. Horizontal and vertical vibration shake tables are also located in this area.

A portion of this floor is devoted to production test of various equipments. Automatic calibration equipment for frequency meters, designed and built at Loral, is shown in use in figure 4. The calibration is automatically typed, at successive points, without requiring any manual action on the part of the operator.

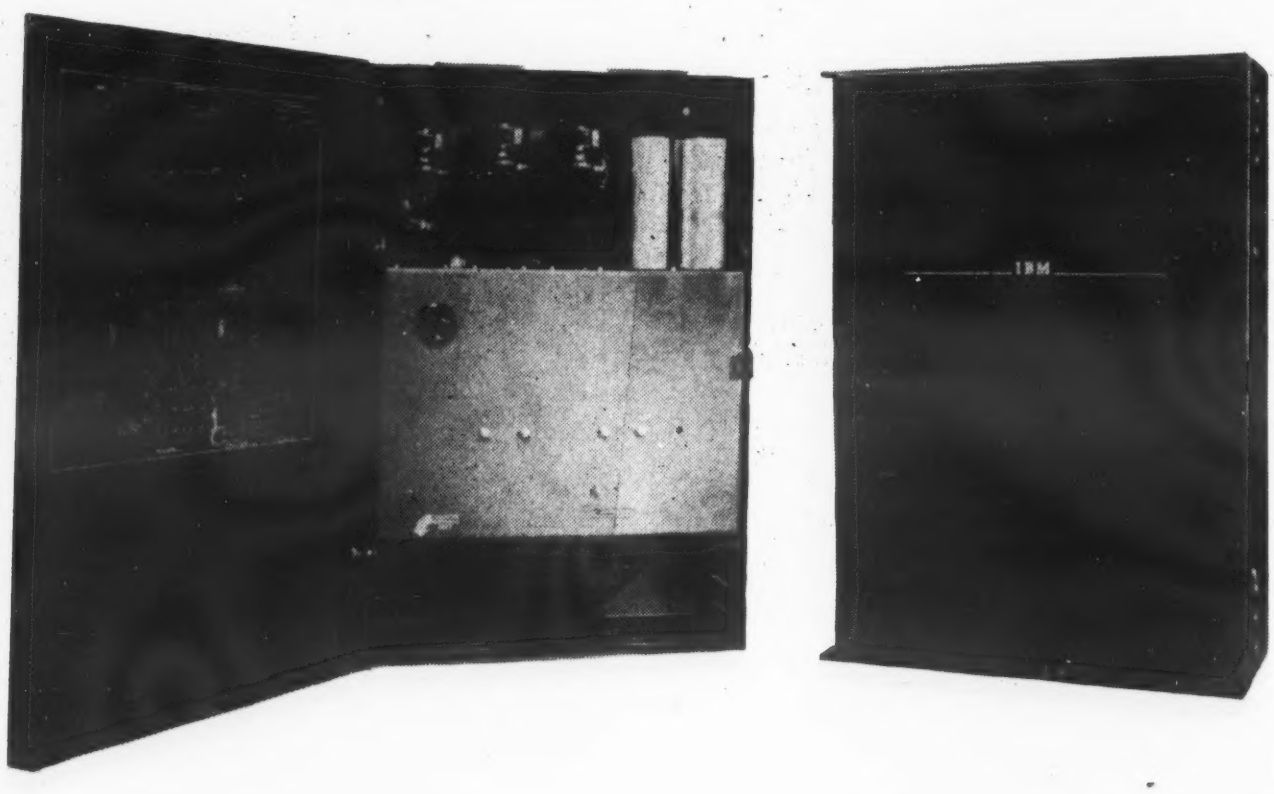
Plant 1 contains over 60,000 square feet of production space, distributed over six floors. This plant has been designed for flexibility and efficiency in the volume production of electronic and electro-mechanical devices. An entire floor is occupied by the stockroom. The second floor is divided between Quality Control and Shipping, with the remaining floors devoted to electrical and mechanical production and test.

At present, almost the entire facilities of Loral Electronics are utilized in the design and production of special equipment for the armed services. The internal organization of Loral has been set up to meet the specific needs of the services and is adapted to the processing of contracts in a logical and efficient manner. Management and contract administration are well-versed in the intricacies of government procurement. Through research and experience, engineering has acquired a thorough knowledge of the stringent performance requirements for military equipments. In addition, the department has at its disposal the most modern test equipment and facilities. As an outcome, Loral has proven its ability to design and produce complex electro-mechanical and microwave apparatus of consistently high quality.

Environmental test chamber.



Loral Electronics time standard signal source.



COMBAT MASCOT

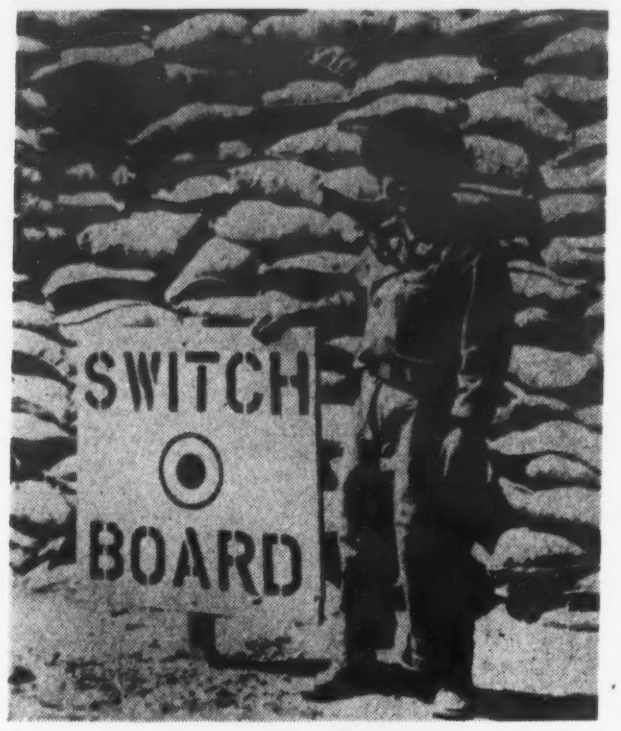
• *To every serviceman the mascot of an outfit is familiar—Here is the 51st Signal Battalion's in Korea.*

The bitterness of the Korean war has never diluted the American soldier's instant sympathy for the civilian refugees. The big-hearted American has tried with the limited means of a busy man to save the broken pieces of what the communists have brutally destroyed. Look inside any mess tent in Korea and you will find the symbol of soldiers generosity, the combat mascot.

He is usually a little fellow, between three and four feet high, dark-eyed and brown-skinned, who wears a cut-down suit of Army fatigues. His real parents are either dead or missing, but with platoons of adopted "big brother" American soldiers feeding and clothing him he is supremely happy for the time being.

"Moonshine" Moon of the 51st Signal Battalion is a typical combat mascot. He carries a typewritten pass which gives these vital statistics: Age, 11 years, weight, 50 pounds; height, 4 feet; profession, "indigenous personnel employed as kitchen police helper."

Calling him a K. P. helper is one way of making his presence in camp official. Strictly speaking, though, "Moonshine" ought to be in one of the orphanages established to care for thousands of other homeless, war-uprooted Korean children. But the officers and men of the 51st would consider any attempt to detach him from the battalion as hostile activity. They like



Moonshine poses for his picture in front of the sandbagged entrance to the I Corps Headquarters switchboard operated by the 51st Signal Battalion in Korea.

him and he likes them, and any snoopy bureaucrat is told that "his mother lives nearby."

"Moonshine" joined the 51st by way of the mess tent. One afternoon in Pyongyang the mess sergeant of R & M Company, M/Sgt. Richard M. Sweeney saw a group of civilian refugees waiting near the garbage pit for hand-outs from the GIs as they finished their meal and washed their mess kits. The next morning the group had moved south, all except "Moonshine." He was all alone there in the dead of winter and it would have taken the meanest graduate of a reform school to order him away. So Sweeney did the only thing he could have done, he invited "Moonshine" inside to get warm.

The two struck up a friendship which has grown into a father and son relationship. "Moonshine" does a few chores for the cooks, has a cot in one of the R & M Company tents, has his own midget-sized wardrobe that includes a cowboy suit and several flashy "Aloha" shirts which came from the States, and basks in the glow of friendship that never runs out.

Wherever he goes, wandering from one company to another in the battalion area, friends call out to him, "Hey, Moonshine! Come over here!" Sometimes he wears his silver oak leaves and crossed flags which were given to him by the battalion commander, Lt. Col. Milton D. Weeks. Then they address him as "Colonel Moonshine."

For a while his new temporary rank went to his head. He strutted around with a superior air, sounding off to anyone who would listen. "Me—colonel!" One day Weeks called for a showdown. When "Moonshine" sounded off one day in the mess tent, he stood up tall and looked down at the pint-sized "Moonshine."

"Me colonel, too!" he announced gravely. "Who *honcho* around here?"

"Honcho" being the Korean word for "boss," "Moonshine" was on the spot. He sized up the real colonel for a long moment and then saluted stiffly. "You *honcho?*" he said.

When "Moonshine" gets too friendly with the officers, the GIs accuse him of bootlicking. But "Moonshine" has caught onto the American style of kidding. He returns their taunts in the kind of language he has picked up rapidly, and which, though a little rough-edged, gets results. It usually throws the laugh back on the first party.

The day "Moonshine's" new duds arrived from the States he kept the whole camp laughing. The new cowboy suit and the flashy "Aloha" shirts were almost too much for one little orphan to wear. But he did his best. He tried on the first "Aloha" shirt, but after a short while he came back to his tent, pointing to the shirt and saying, "Dirty" It wasn't soiled but it was his excuse to wear them all in one day, one right after another.

Moonshine starts his day with a briefing from M/Sgt. Richard M. Sweeney who is acting as his foster father for the duration.

This new life with the Americans has built a wall around his other childhood memories. He doesn't remember his real name now and no one in camp thought to ask him in the beginning. Somebody dubbed him "Moonshine" and it stuck. If anyone asks him what his first name is, he says, "First name, hava-no." Then if he is pressed for an answer, he stops and thinks before answering slowly, "My name 'Moonshine' Moon."

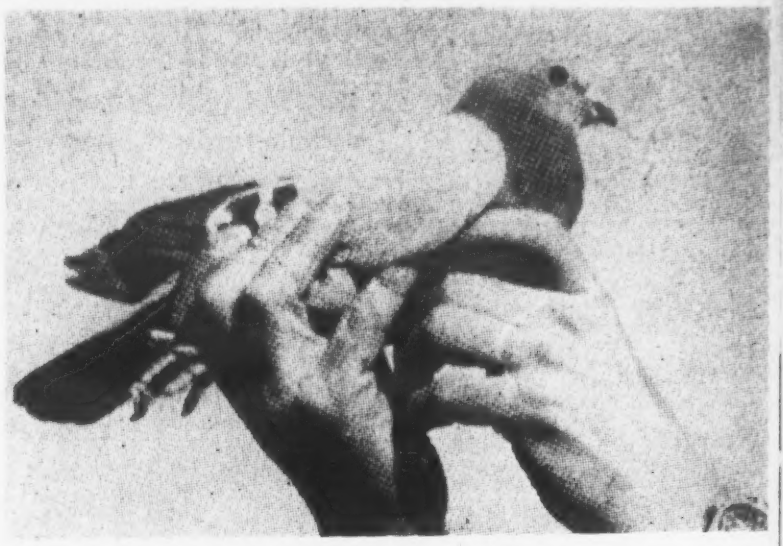
There is only one thing which would identify him among a hundred other Korean children. Half of one ear is missing. Listening to his account, in halting English, of how he lost part of his ear, one gets the idea he was climbing a tree to chop branches with an axe. With a little motion of his arm he demonstrates how the axe came too close. Then he says afterward without any self-pity, "Ear-hava-no!"

Strange as it may sound that is exactly how a small boy could lose an ear in Korea. It is a poor land where even the bough of a pine tree is precious as fuel. And it is this terrible poverty of the land and the people which makes this war so cruel. No American who has been there can ignore the anguish in his heart when he sees it.

Right now the American soldier in Korea is too busy to do much about that anguish. The war takes all his time, except for the little pieces of broken lives he picks up along the wayside. "Moonshine" is one of those little pieces of humanity. Helping him isn't much, but it is something.

• • • — • —

Chaplain Cpt. John G. Burkhalter has Moonshine in his congregation each Sunday evening.



CARRIER PIGEONS

Serving again in Korea

The old fashioned pigeon is in business today in Korea. Not at the same old stand but for the same old purpose.

Back in July of 1951 the need for a speedy, yet mobile, means of communications to serve small probing patrols was recognized. Wire, although it has been reduced in weight and bulk until a man can carry a mile length on his back, wasn't the answer. Even the compact new "pay-out" reels were an obstacle to creeping and crawling. Then too, even a whispered conversation carries a long way on a cold, still night. When patrols go out the enemy gets pretty close. Radio wasn't the answer either. Handie-talkies, walkie-talkies, and the "Angry 9" are all highly portable but the enemy has a bad habit of "zeroing in" radio positions and plastering the general area with shot and shell—not conducive to long life or secrecy.

Then someone suggested pigeons, and the Signal Corps came up with a loft of them. The Signal Corps has continually recognized the need for pigeons and maintains breeding and training lofts at the Signal Corps Center, Fort Monmouth, N. J.

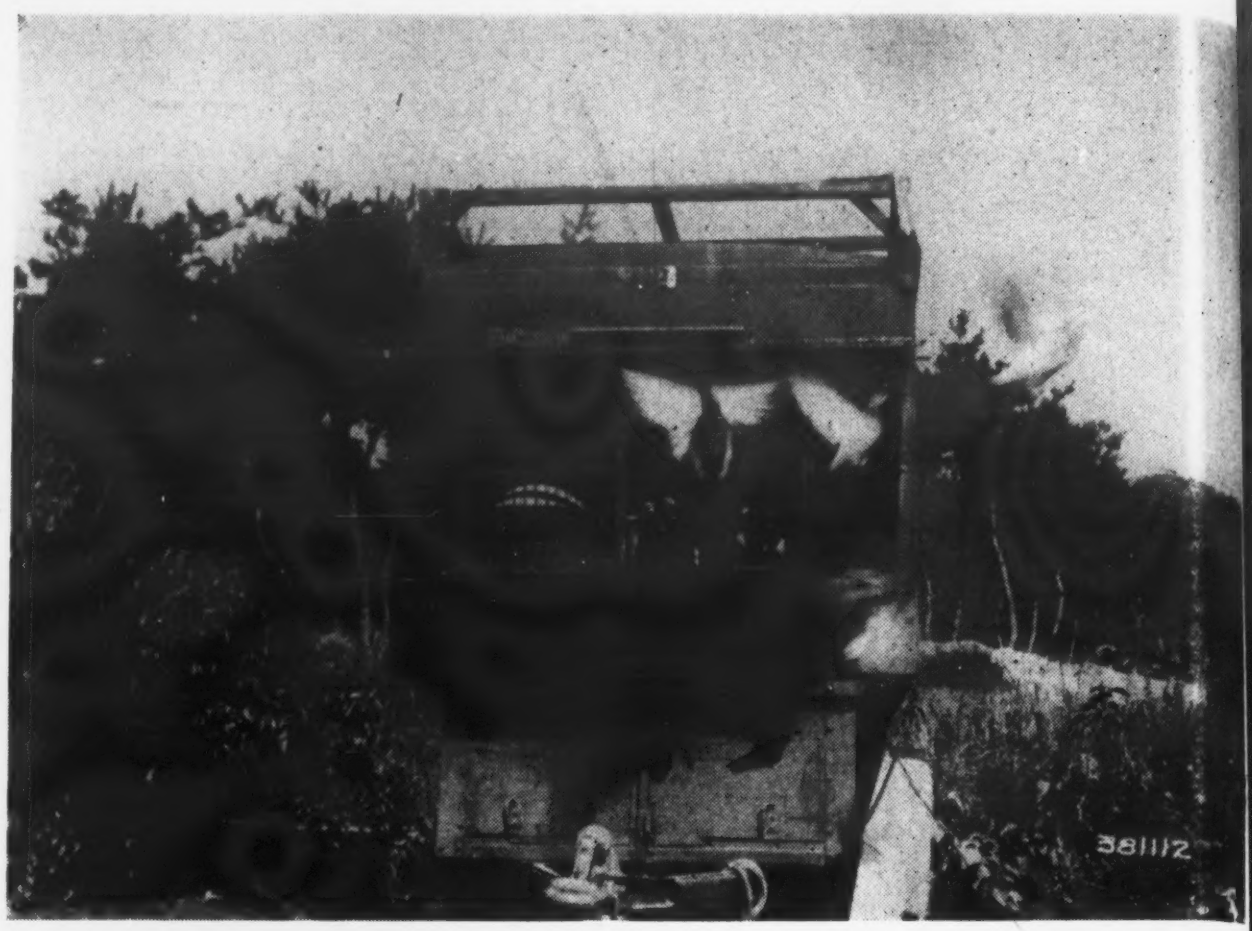
On July 25, 1951, the first shipment of 60 birds arrived at one of the Corps Headquarters in Korea. The handling and training of these birds is a job requiring infinite skill and patience. Pigeons are temperamental, extremely intelligent when they attain a secure knowledge of their surroundings, but very timid until sure. The "bird boys" at Corps set up one of the new experimental lofts, which is mounted on a one-ton trailer, enclosed the loft with wire netting, and let the pigeons walk around their new home to exercise and become acquainted with the surroundings.

After seven days of familiarization, the birds were allowed to leave the enclosure, the trainers being careful that the pigeons were not fully fed to assure their return when hunger set in. Two "leaders" were selected because of their habit of returning to the loft after a short flight. These two birds were always released first to provide an example for the "followers." The practice was continued for seven days. During these "free" flights, seven birds were lost. Three of the seven returned after absences

Member of headquarters company straps a capsule containing a message on a carrier pigeon's leg at Regimental Headquarters, Korea.

up to four days. You've probably heard the story about the homing pigeon who, on a flight from Fort Monmouth to Washington, had not appeared after three days. The pigeon fanciers were about to give the bird up as lost when a scratching sounded at the door. The OIC opened the door and there stood the pigeon, covered with snow, holding up an injured foot on which leg the message capsule was attached. Subsequent investigation revealed that the bird had been forced down by bad weather over Baltimore and had walked the rest of the way. Far fetched? A little, perhaps, but there are cases on record where birds have actually walked home with badly injured wings..

After the week of "free" flying, birds were taken to progressively distant points from the loft until after about two weeks the pigeons would "home" from 15 miles in any direction. The message capsule was attached for each flight and the birds were flown daily regardless of weather. After seven weeks of training, birds have flown as far as 57 miles. The birds have been used operationally for distances up to 35 miles.



Off with a burst of speed the carrier pigeons are released from their roost for their daily exercise.

Captain George Boston, second from left, of the 7th Republic of Korea Division Signal Advisor, watches as corpsmen place carrier pigeon into releasing box.

The major hazard to this means of communication in Korea is the hawk. These Korean hawks are enormous birds which resemble young eagles and, like the people of the land they live in, are hungry. A high percentage of the pigeons fall prey to this carnivorous bird. Twenty pigeons of a total of 116 received are known victims of the "enemy." Only one pigeon is known to have been killed by "friendly" forces, this by a U.N. soldier who, as the Signal Officer of the unit concerned explained it, "had a language barrier problem."

The other problem is terrain, the same problem that faces the fighting man. The pigeons prefer following rivers and valleys rather than flying over a mountan, thus lose valuable time. No one has yet figured out how to convince the feathered flock that the shortest distance between two points is a straight line.

Pigeons have proved their worth in Korea for certain missions. Operational uses have borne this out. It is planned to continue the breeding, and training of pigeons for operational use. Evaluation of performance over terrain found in Korea may prove extremely useful for future planning.

THE Lewyt STORY

About Alex. M. Lewyt, President

While the Lewyt Corporation is far from a one-man operation, it is sufficiently compact for the driving energies of its president, Alex M. Lewyt, to be felt at all levels. He is the type of person who walks through the factory upon his arrival at work —he calls many of his employees by their first names, and in turn may be called by his first name. One gets the feeling that the employees feel themselves to be a part of the Lewyt family rather than of the Lewyt Corporation.

To the public Mr. Lewyt is probably best known for his Lewyt Vacuum Cleaner, which he invented, or perhaps for his many civic and philanthropic works. To the Armed Forces he is recognized for the difficult tasks and the problems he and his company have accomplished to meet contract schedules, etc.

His has been described as the "proximity fuse" type of mind—a mind which explodes into action whenever it nears an insoluble problem. Whether inventiveness and ingenuity are obtained through heredity or environment is a question still being argued, however, Alex Lewyt possesses these qualities. His father, who invented and manufactured various metal products, accepted the aid of his eager son when Alex was only fourteen. Lewyt began his education performing the many jobs required to learn a business from the ground up. While learning at the bench he acquired his know-how of engineering and business administration at New York University, Pratt Institute and Brooklyn Polytechnic Institute.

Early History of the Lewyt Corp.

Founded in 1888, Lewyt manufactured precision metal products for many of the country's leading manufacturers. During World War I numerous items were produced for the Armed Forces, namely, motor housings, telephone switchboards, chassis, and electrical wiring.

Since its inception, flexibility of operation was paramount with Lewyt and during this time the company decided to manufacture more and more of its own components to become as near self-sufficient as possible.

When the gigantic National Defense Program began in 1941, Lewyt was ready with organized management and geared for production in the manufacture of electronic and mechanical products. Recognizing this challenge inherent in war production, Lewyt increased its labor force to 1,500 and procured additional tools and test equipment. Where it was impossible to obtain certain critical tools and machinery, Lewyt engineers and toolmakers designed their needs and covered existing equipment for immediate use. The ingenuity of Lewyt employees has resulted in their having accomplished some of the most complex problems found in production, both on long and short production runs. Typical of the many wartime products manufactured are; sound locator equipment, binocular mounts, salinity indicators, automatic pilots, high-voltage control panels, bomb sight cases,

A display of various coils, condensers and transformers, all manufactured by the Lewyt Corporation in line with its policy of making as many of its components as possible.

teletypewriter cabinets, vibration test equipment, gyro-compass amplifiers, aircraft fire controls, 36 and 60 inch search light controls, airborne receiver-transmitters with records and radio direction indicators, guided missile receiver-transmitters, Navy radar receiver and synchroscopes and servo amplifiers.

Because of its excellent production record and engineering skills in manufacturing such a diversified list of defense items, the Lewyt Corporation proudly possesses an award from the War Department for "Managerical and Engineering Assistance to the Chief of Ordnance and the New York Ordnance District" as well as the "Army-Navy "E".

The Lewyt Corporation Today

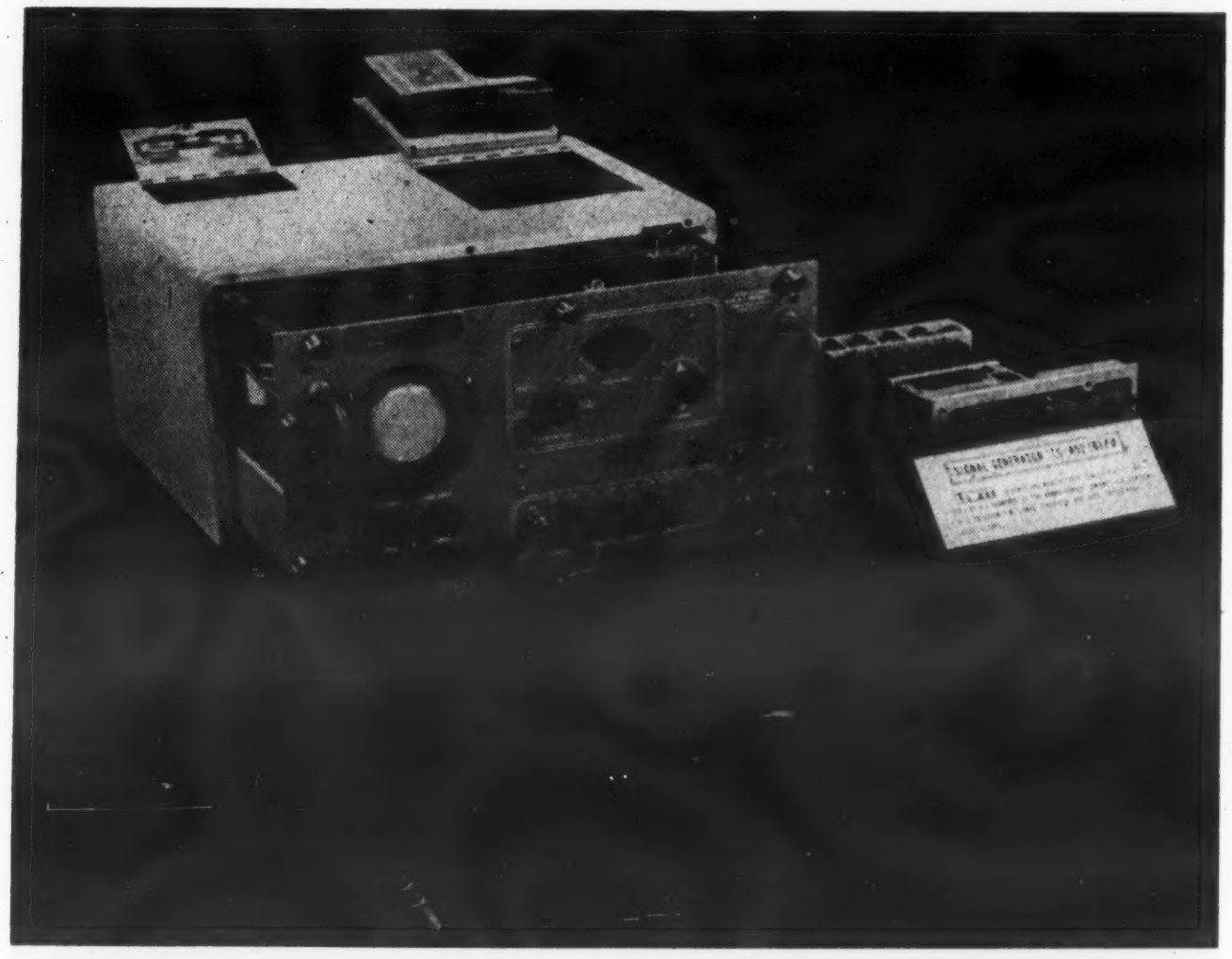
Following the close of World War II when government contracts were cancelled and civilian production began to develop, Lewyt maintained a middle-of-the-road policy, that is, with their flexibility they kept an organization that could be geared to manufacture both consumer and defense materiel. Just as they had used their pre-war contract manufacturing experience to aid in war production, they now would draw upon the tremendous wartime production program to aid in the development of post-war plans. This resulted in the production of the now famous Lewyt Vacuum Cleaner.

Alex Lewyt (center) shows Lewyt hand generator to Lt. Col. J. M. Goodman, left, representing the Contracting Officer, SigCorps Supply Agency, Philadelphia, Pa. Right: Capt. W. C. Morch, Resident SigCorps Inspector at Lewyt plant.

Today, this company has more than 1,800 employees and occuping a space of 200,000 square feet for engineering and production in Brooklyn, New York. It is an integrated production organization set up to handle all phases of development and production for a wide variety of products. Coordinated with. and acting as a stabilizing factor for the contract manufacturing section is the vacuum cleaner assembly line and laboratory.

Typical of this coordination between civilian and military production is the instance of the production of the AN/GRC-9 communications set for the U.S. Army Signal Corps.

Signal generator TS-452 (B)/U. Lewyt designed and manufactured this unit used by all branches of the Armed Forces. The unit combines the functions of a precision FM signal generator and high frequency oscilloscope.



For this equipment to operate under all type of conditions, one prime requisite is that the set must be watertight. Normal procedure required immersing the set in water but, if there was any leakage, water damage would make it unsalvageable. Both time and equipment would have been lost. Lewyt engineers soon adapted a Lewyt vacuum cleaner to simulate the water test. If the set is vacuum-proof it is also water-proof! So, Lewyt designed special hoses to connect the vacuum cleaner to the set, create a vacuum, and require this vacuum be maintained at a certain level for a period of time. If the vacuum level is held, the set is water-proof. If the set does not hold a vacuum, the point of leakage is swiftly located and corrected without damage to the electronic equipment. So successful is the test that other electronic manufacturers are using the Lewyt cleaner for this purpose.

Recently, Lewyt design engineers were requested to develop a new power supply for the AN/GRC-9 unit. Using an entirely new approach, the problem has been solved with a power supply embodying basic engineering principles that offer greater reliability, reduction in weight of 63 pounds, 75% reduction in components, 80% reduction in amount of wiring and the number of transformers reduced 90%. Not to be overlooked is the saving effect in vitally needed steel, copper and aluminum plus the saving in man-hours needed to manfacture the new unit. Since it has far less component parts it will require less time for assembly and for maintenance in the field. Indirect savings will result in transportation and handling costs, in processing, in relieving factor facilities, and in making skilled personnel available for the manufacture of other items.

Cognizant of supply problems—an integral part of their flexibility program—Lewyt is concentrating much effort toward this phase of production. With the government's increased emphasis upon defense production the availability of certain components has become quite a problem. As a matter of fact, Lewyt found, as did many other organizations in the electronics field, that components such as capacitors, transformers, coils, quartz crystals and chokes were becoming increasingly expensive and scarce. In order to assure itself of a sufficient supply of these components, the Lewyt Corporation has now

organized departments for the manufacture of many of these components itself.

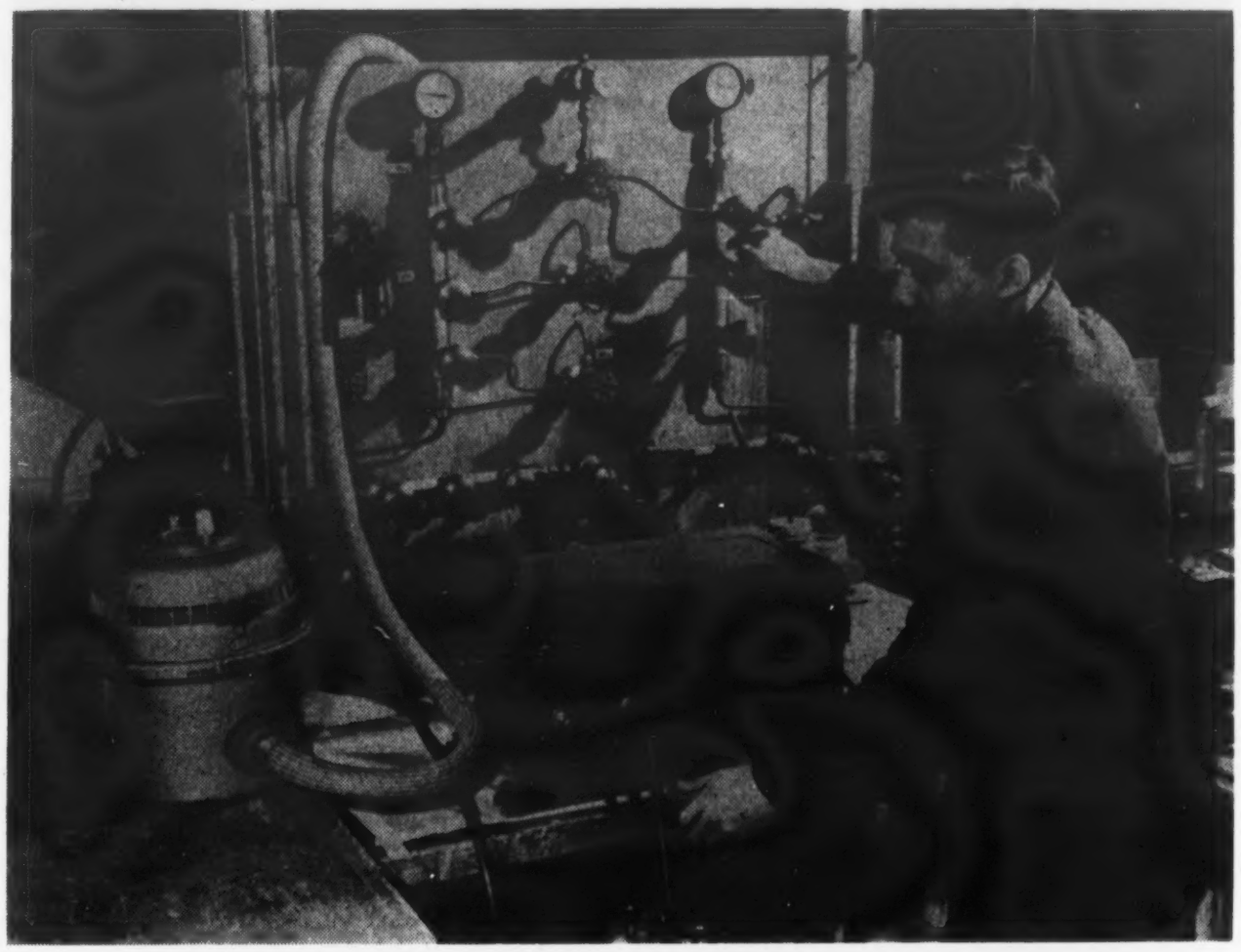
Demonstrating its high degree of flexibility the company is now producing its own transformers, variable condensers, coils and chokes in sufficient quantity to meet all of its requirements.

In addition they are planning to begin the manufacture of their own quartz crystals, feeling that an inadequate supply of these vital parts will be a greater problem than their manufacture.

While the manufacture of such items looms large in the overall operation of any organization which has never manufactured them before, for Lewyt it is just another problem. An ideal illustration of the company's outlook and attitude to such problems is exemplified in the manufacture of transformers. The availability of these components is becoming threatened. When the supply is exhausted, what to do? The answer—make the transformers!

Basically, it was more a problem of manufacture than engineering. Coil winding machines were redesigned by Lewyt engineers who also developed special attachments for them. The new Lewyt-made transformers meet all joint Army-Navy tests, applicable to all types of transformers they manufacture.

While the Lewyt Corporation is better known to the general public for its Lewyt Vacuum Cleaner, a comparatively recent product for the 64-year old organization, they have a long and fine record as contract manufacturers of precision equipment, both electronic and mechanical, which is not so well known to the lay public. Today, the Lewyt Corporation is now simultaneously manufacturing 118 different products, and some of these products have as many as 6,000 parts in each assembly. The problem of keeping count of over 700,000 different parts and of preventing the duplication of effort when the same part may be used for several different projects is one of major



Employee at Lewyt testing Vibrator Power Unit PE-237 to assure that the unit is water-tight. Lewyt engineers have adapted a Lewyt vacuum cleaner to simulate the usual water test. If the set is vacuum proof, it is also waterproof.

proportions. Its material control system is continuously being reviewed by representatives of leading manufacturers desirous of observing the efficient manner in which it is operated.

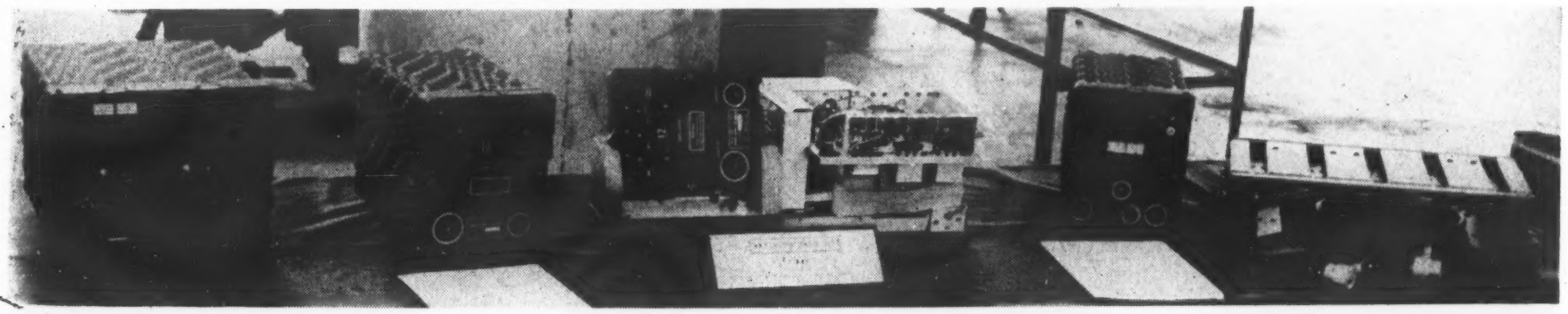
When Lewyt receives a contract for electronic equipment it manufactures the tools and textures for the assembly line and for forming the chassis; it forms the chassis regardless of the intricate machine operations that may be involved; and, it may manufacture up to 65% of the parts required for the assembly.

Among the many different items rolling off the assembly lines are the AN/GRC-9 set, signal generators, automatic raters, special purpose Navy radio receivers, Signal Corps hand generators, Navy gun Controls, Army gun controls, pre-amplifiers, regulator inverters, transformers, mast bases, vibrator power supplies, condensors, jet engine starter cowls, jet engine turbine housings, shock mounts, United Nations simultaneous translation receivers, variable condensers, coils, AN/GRC-3 to 8 series (3 groups of radio equipment identical except for frequency range), gear assemblies, variable capacitors, switches, generator drive assemblies, chassis, racks, sheet metal panels, housings, cabinets, guided missile components, Western Union network repeaters and automatic numbering machines.

Typical plant efficiency is indicated on the vacuum cleaner assembly line. One of the features of this line is the merry-go-round type of conveyor which serves as its stockroom. The assembly line consists of a long rectangular work bench at which the workers are seated. Rotating circumferentially about this assembly line is the perpetual stock room upon which are placed all the major components of the final assembly. Another example is the mobile assembly now in use. This line which is mounted on wheels can be broken down and moved to a new location

(*Continued on page 80, col. 1*)

Portions of the AN/GRC 3-8 series of radio receivers-transmitters.



From the President

In his first message to the membership as National President of the AFCA, Wally Watts stresses the fact that to build a large and strong association we must have active, aggressive chapters whose membership is constantly increasing.

Under the By-laws of the Armed Forces Communications Association, the membership elects the National Council which in turn elects the Board of Directors. The Board of Directors is empowered to elect the officers for the fiscal year, and has seen fit to elect me President for the current term. I wish to take this opportunity to thank the entire membership, Council and Directors for bestowing on me this great honor.

As you may know, I was a founder and first President of the Philadelphia Chapter, and later was honored by being elected both a National Director and National Vice-President in charge of chapters. Participation in these activities has amply confirmed an original conviction that the success or failure of the AFCA is tied directly to the quality, quantity, and strength of the local chapters.

Here I should like to quote a few significant facts with respect to Association activities. Regular membership since our present Executive Secretary was appointed has increased from under 4000 to over 6000; group membership from 139 to 175; local chapters from 32, of which 21 were active, to 42, of which 35 are fully active. The annual number of local chapter meetings has increased over 50% above the 1949 total of 109. Work on organizing five new chapters and increasing our regular membership is progressing.

While this is a performance of which all can be justly proud, we cannot continue it without proper support at the local chapter level, and unless we can create the kind of interest that establishes new and active chapters in our major cities and military establishments.

The development of chapter activity and membership has been matched by that of the revitalized and enlarged SIGNAL magazine. Circulation is now 7,800 copies, an increase of 2,000 over April 1950. The 1952 issues contain the advertisements of nearly 40 manufacturers and institutions interested in the field of electronics, communications and photography. This compares with a total of only 12 such advertisers in 1949.

This in itself has brought increased contribution in the way of stories and editorial material to SIGNAL Magazine and a more vital and living contribution to the military-civilian field of communications-electronics-photography which it covers.

I know I can count on your support in all matters pertaining to strengthening the AFCA during my term of office, but I cannot let the opportunity pass in my first message to you to emphasize and re-emphasize the importance of strong and active chapters. A study of the history of all other organizations, fraternities, and trade associations indicates that only those with strong local chapters have prospered and gone forward to become a vital influence in the field of their particular interest.

Again I wish to thank you for the generous support all of you have given to the organization and its officers in the past, and I urge you to write me directly concerning your recommendations for making the AFCA mean more to you.

W-W-Watts

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The Forum

The forum on military-industrial production and procurement contractual problems turned out to be one of the most interesting events of the national convention in Philadelphia.

Speaking for Frederick R. Lack, vice president of Western Electric, who was unable to attend, Thomas DeNyse, assistant manager of government contracts, Western Electric, pointed out that present procurement practices make the cost of items and services out of proportion to their actual value, a matter of particular concern to the communications industry which prides itself on low-cost service. He declared that unnecessary expenses to the suppliers, and thus to the armed services, result from present regulations.

Brig. Gen. Phil Smith, USAF, chief of procurement, Wright Field, stated that partial payments on contracts have been discouraged by the new regulations. V-loans are no longer as high since private financing is carrying a much larger part of loans to government suppliers.

Mr. R. E. Carlson, vice president, Tung-Sol Lamp Works, Inc., discussed the problems of components producers, emphasizing the need for "freezing" component designs whereever possible. He also added a plea for the use of some "old-fashioned horse sense" in the auditing of contracts.

Capt. L. P. Kimball, USN, asst. director of contract operations, procurement division, office of Navy materiel, described procedures to be followed in securing payment of invoices, and referred to a recent Navy bulletin "How the Navy pays its bills."

Raymond S. Perry, vice president and general manager, Federal Telephone & Radio Corp., praised highly the Signal Corps' program of directed subcontracting, which provides that the developer of an item receives the first prime contract but is required to subcontract to a number of other selected firms which later will become prime contractors. He said this is made necessary by the fact that only the larger companies can maintain large-scale research and development programs during peacetime.

Brig. Gen. Wayne Allen, asst. chief, procurement div., Office of Assistant Chief of Staff, G-4, stressed that Army procurement was operating under instructions to follow only the best business practice. Referring to the Armed Forces procurement regulation, he said it had been written to make sure that the government was fully protected.

Lou A. Connelly, manager, government equipment sales, RCA Victor Div., detailed the efforts by various industrial associations to assist both the services and industry in procurement problems and urged that full cooperation be given to these efforts.

A lively discussion followed, skillfully moderated by Harry LaBrum, with members of the forum answering questions from the floor. Among the many points covered were: a "single package" contract; the re-determination clause; fixed price contracts; advertised bids and negotiated bids; the escalator clause; insufficient time between bid and quotation; shortage of engineers; etc.

SIGNAL Editor to National Parking Association

Wallace R. Fingal, who for over four years was employed by the AFCA as Asst. Editor and Editor of the Association's bi-monthly magazine SIGNAL, recently accepted a position with the National Parking Association. Wally was well known to many readers of SIGNAL and his ability and interest in the magazine is evidenced by the fine periodical we now have.

Best wishes and good luck go with him from all the AFCA Headquarters Staff.

Colonel George P. Dixon, Executive Secretary, has assumed the additional duties of Editor. Mr. George C. Ruehl, Jr. has been added to the staff as associate editor.

Col. W. P. Corderman Promotion

Colonel W. Preston Corderman, Commander of the Signal Corps Supply Agency in Philadelphia, was promoted to Brigadier General this week.

General Corderman was assigned as Commanding Officer of the Signal Corps Procurement Agency last fall and when the Procurement and Stock Control Agencies were consolidated on January 1, 1952, he became the commander of the new Supply Agency. He was Executive in the Office of the Assistant Secretary of the Army, Earl Johnson, for over a year before going to Philadelphia.

In January 1943 he was assigned as Commanding Officer of Arlington Hall Station and Signal Security Agency. In October of that year he became Commanding Officer of the Army Security Agency.

Early in the summer of 1946 General Corderman became Signal Officer, United States Forces, European Theater. Later he was Assistant Chief of Staff, G-1, Headquarters, Continental Base Section, Bad Mauheim, Germany.

General Corderman returned to the United States in 1947 to become a student at the National War College. In June 1948 he was assigned as Director of Communications, Alaskan Command, and, later, Chief of Staff of that command.

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AFCA GROUP MEMBERS

Communications—Electronics—Photography

Listed below are the firms who are group members of the Armed Forces Communications Association. By their membership they indicate their readiness for their share in industry's part in national security. Each firm nominates several of its key employees or officials for individual membership in AFCA, thus forming a group of the highest trained men in the electronics and photographic fields, available for advice and assistance to the armed services on research, development, manufacturing, procurement, and operation.

Acme Telectronix
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Bergsma Brothers
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Espey Manufacturing Co., Inc.
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Federal Telephone & Radio Corp.
General Aniline & Film Corp.
General Cable Corporation
General Electric Company
General Instrument Corp.
General Insulated Wire Works, Inc.
General Telephone Corp.
General Transformer Co.
Gilfillan Bros., Inc.
Globe Wireless, Ltd.
Graflex, Inc.
Gray Manufacturing Co.
Guardian Electric Mfg. Co.
Hallicrafters Company
Haloid Company
Hazeltine Electronics Corp.
Heinemann Electric Company
Hercules Motor Corp.
Hoffman Radio Corp.
Hughes Aircraft Company
Hycon Manufacturing Company
Ilex Optical Co.
Illinois Bell Telephone Co.
Indiana Bell Telephone Co.
Indiana Steel & Wire Co.
Indiana Steel Products Co.
Institute of Radio Engineers
International Resistance Co.
International Tel. & Tel. Corp.
Jacobsen Manufacturing Co.
James Knights Co., The
Kellogg Switchboard & Supply Co.
Kester Solder Company
Kleinschmidt Laboratories, Inc.
Lavoie Laboratories
Leich Sales Corporation
Lenkurt Electric Company, Inc.
Lewyt Corporation
Lenz Electric Manufacturing Co.
Loral Electronics Corporation
Machlett Laboratories, Inc.
Magnavox Company
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Mallory & Co., Inc., P.R.
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Motorola, Inc.
Mountain States Tel. & Tel. Co.
Muter Company, The
National Cash Register Co.
National Company, Inc.
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New Jersey Bell Telephone Company
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Oak Manufacturing Co.
Ohio Bell Telephone Co.
O'Keefe & Merritt Company
Pacific Mercury Television Mfg. Corp.
Pacific Telephone & Telegraph Co.
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Photographic Society of America
Pickering & Company, Inc.
Pioneer Electric & Research Co., The
Platt Electronics Corporation
Precision Apparatus Co., Inc.
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A page from the note-book of Sylvania Research

Special coil eliminates effects of magnetic fields in Electron Optical Studies

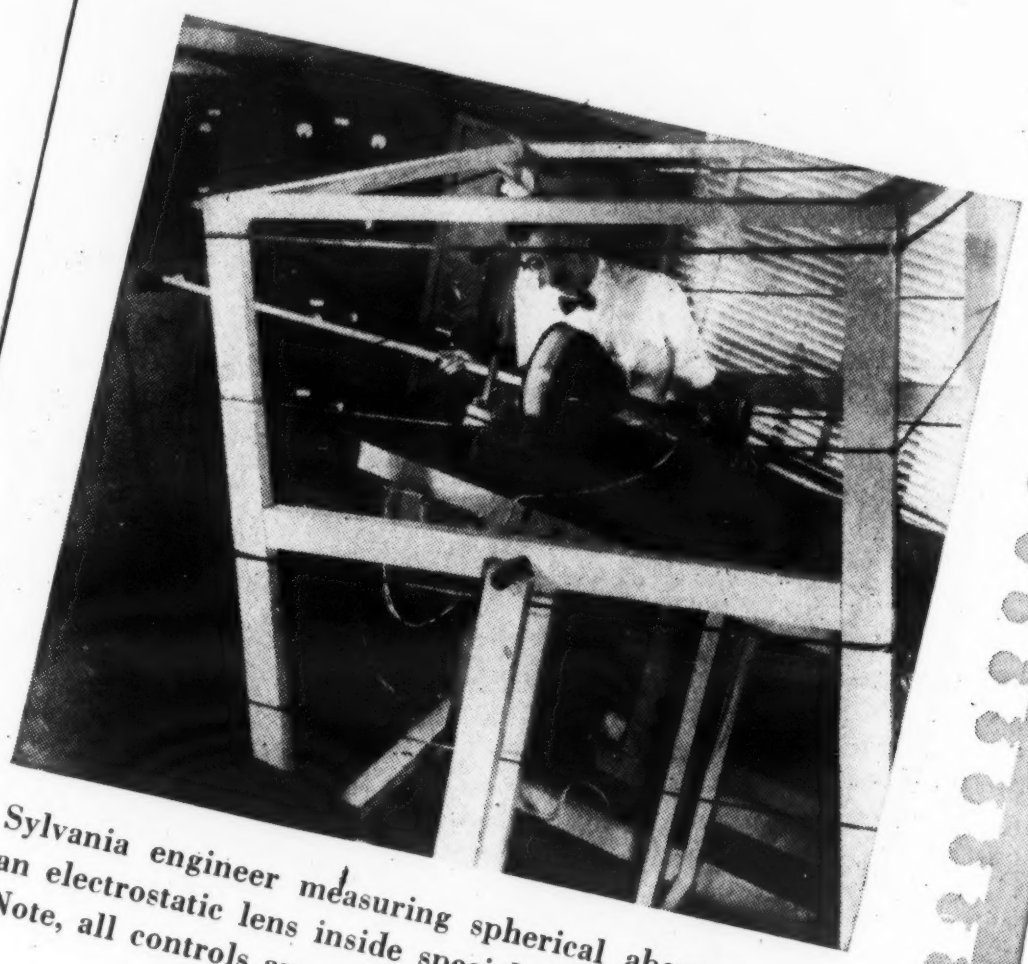
In maintaining greatest possible accuracy in electron optical experiments, it is imperative that the beam be perfectly aligned *axially*.

To assure this result it is necessary to eliminate the effects of all stray fields . . . including the earth's magnetic field.

This is now accomplished at Sylvania Research Laboratories by a specially designed modified Helmholtz type coil which produces a uniform magnetic field which compensates for the effects produced by the earth's field and local fields. The coil frame is made entirely of wood and is oriented exactly along the earth's field. It is uniform to 1 part in 500 over a volume enclosed by a cylinder 20 inches in diameter and 30 inches long. The axis of this cylinder is the axis of the coil.

This field is then explored by a special Cathode Ray Tube to make sure the net field registers zero over the entire working region within the coil.

Such strict attention to fundamental research in every phase of electronics and radio development pays off in the outstanding performance of all Sylvania Tubes.



Sylvania engineer measuring spherical aberration of an electrostatic lens inside special Sylvania-built coil. Note, all controls are outside the coil.

SYLVANIA

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

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Atlanta

P. R. Curry of Western Electric was elected chapter president at the annual meeting held on March 31st. Other officers chosen were: 1st vice-president—Lt. Col. C. A. Butler, Third Army Signal Section; 2nd vice-president—Jack Evans, Western Union; 3rd vice-president—Robert J. Smith, Atlanta General Depot; 4th vice-president—Erwin C. Lentz, Georgia Tech; secretary-treasurer—Ralph P. Wooten, Western Electric.

Guest speaker at the dinner-meeting was Major Leo B. Sullivan, recently returned from Korea. Major Sullivan, who was a regimental communications officer during the early phases of the Korean conflict, gave a most interesting first-hand account of communications in the infantry. He pointed out the difficulties encountered in establishing and maintaining communications for units in the field, particularly during the initial phases.

One hundred twenty members and guests were present for the dinner meeting at Fort McPherson Officers' Mess and the social hour which preceded it.

Ralph Grist, past president of the chapter and AFCA southeastern area representative, and "Snuffy" Smith were chosen to represent the chapter on the National Council at the convention in Philadelphia.

Baltimore

The Gas & Electric Company was host to the Baltimore Chapter on March 19th. The first half of the program called for dinner in the company cafeteria and a business meeting, and the rest of the evening was devoted to a tour of the company's facilities.

With the aid of guides and lecturers, the forty-three members and guests secured a comprehensive picture of the AC systems analyzer, load dispatcher board, and electrical trouble dispatching center.

Another interesting tour featured the chapter's April meeting when a visit was made to the WMAR-TV station on April 23rd. The attendance was divided into three groups which rotated at half-hour intervals as follows: (1) top of Mathieson Building to inspect the TV transmitting station and enjoy view of Baltimore from balcony, 34th floor, 515 feet above Baltimore; (2) Television mobile unit parked on Charles Street; (3) WMAR-TV studios in Old Sun Building.

Prior to the meeting, the members and guests met for a steak dinner at Marty's Restaurant.

The Baltimore and Washington chapters have been invited by Lt. Gen C. B. Cates, Commandant, Marine Corps Schools, to attend a demonstration and program of entertainment by the Marine Corps Schools at Quantico, Virginia, on May 31st. The members of the two chapters will meet in Washington and proceed by bus to Quantico.

Decatur chapter members toured the University of Illinois college of engineering at Champaign, Illinois. Photo taken near the 340 million energy volt Betatron.

Boston

Rear Admiral John R. Redman, director of communications-electronics, Joint chiefs of Staff, addressed the April 17th meeting of the Boston Chapter.

Discussing the Joint Communications-Electronics Committee, of which he is chairman, Admiral Redman reviewed the reasons for its establishment in 1947 under the provision of the National Defense Act, explained what the committee is, what it is charged with doing and what it is actually doing. He stated that the mission of the Joint Communications-Electronics Committee was "to insure maximum economy and efficiency of military communications and to strengthen the direction and coordination by the Joint Chiefs of Staff of communication-electronics activities of the Department of Defense."

(Editor's note: Believing that many AFCA members will be interested in reading Admiral Redman's entire speech, we will publish it in the July-August issue of SIGNAL. Due to the amount of space required for the convention story we are unable to include the speech in this issue.)

Chicago

The chapter's February meeting, programmed especially for wives of members, was held appropriately enough on the 29th of the month, and a record guest turnout of more than 50 brought total attendance over the 160 mark. The feature of the meeting was a tour of the entire facilities of the American Broadcasting Company's TV station in the Chicago Civic Opera Building.

The tour of the ABC transmitter and studios was arranged through the courtesy of Mr. W. R. Cummings, engineer in charge, who welcomed the members and guests in the Electric Association dining room where the dinner and short business meeting was held.

The attendance was divided into small groups, which split the total among the various floors, studios, transmitters and control equipment comprising the TV station, so that all had a chance to ask questions about the technicalities and technique of operation. Of perhaps greatest interest were the television cameras which embody all three major elements of AFCA emphasis - photography - electronics - line transmission.

After the TV station tour, facilities were available to the members and guests to attend the ABC television theater in the building and see an actual hour telecast of a variety show.

A photographic meeting was held

National Director of Chapters: **W. W. Watts, RCA Victor Div., Camden, N. J.**

AREA REPRESENTATIVES FOR CHAPTERS

Area A: George W. Bailey, IRE, 1 E. 79th St., New York, N. Y. *New England States, New York, New Jersey*

Area B: J. H. LaBrum, Packard Building, Philadelphia, Pa. *Delaware, Kentucky, Maryland, Ohio, Pennsylvania, West Virginia and Virginia*

Area C: Ralph S. Grist, So. Bell T&T Co., Atlanta, Ga., *Southeastern States along Atlantic and Gulf coasts—from North Carolina to Louisiana including Tennessee*

Area D: E. H. Mittanck, 711 Telephone Bldg., Dallas, Tex. *New Mexico, Texas, Oklahoma, Arkansas*

Area E: T. S. Gary, 1033 W. Van Buren St., Chicago, Ill. *Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, North Dakota, South Dakota, Wyoming, Colorado*

Area F: *Harry E. Austin, 28 Geary St., San Francisco, Calif. Arizona, Utah, Nevada, California, Idaho, Oregon, Montana and Washington*

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AUGUSTA-CAMP GORDON: President—Charles Eberhart, Southern Bell T&T, 937 Greene St., Augusta, Ga. Secretary—John W. Owen, Southern Bell T&T, 937 Greene St., Augusta, Ga.

BALTIMORE: President—Henry W. Williams, 3953 Cloverhill Rd., Baltimore, Md. Secretary—Donald C. Lee, Westinghouse Elec. Corp., 2519 Wilkens Ave., Baltimore, Md.

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DECATUR: President—Louis Yack, 2050 N. Main St., Decatur, Ill. Secretary—Chester B. Badgett, Decatur Signal Depot, Decatur, Ill.

EUROPEAN: President—Lt. Col. Andrew D. Stephenson, Sig Div, Hq EUCOM, APO 403, c/o PM New York. Secretary—George A. Spear, SigSec, Frankfurt Mil. Post, APO 757-A, New York.

FAR EAST: Acting President—Brig. Gen. Elton F. Hammond, SigSec, GHQ, FEC, APO 500, San Francisco. Tokyo Post: Chairman—Lt. Col. M. Heskett; Secretary—Lt. Col. R. M. Johnson.

FORT MONMOUTH: President—Col. Eugene A. Kenny, 11 Allen Ave., Fort Monmouth, N. J. Secretary—Lt. Col. George F. Nagle, Officers' Dept.. TSS, Ft. Monmouth, N. J.

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KENTUCKY: President—Col. H. T. Gallagher, Lexington Signal Depot, Lexington, Ky. Secretary—Clyde T. Burke, Lexington Signal Depot, Lexington, Ky.

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RIO: Acting President—Herbert H. Schenck, Caixa Postal 709, Rio de Janeiro, Brazil.

ROCHESTER: President—John Whittle, Eastman Kodak Co., 343 State St., Rochester, N. Y. Secretary—R. G. Bowie, Eastman Kodak Co., 343 State St., Rochester 4, N. Y.

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WASHINGTON: President—Percy G. Black, 906 Munsey Bldg., Washington, D. C. Secretary—W. P. Dutton, RCA Victor Div., 1625 K St. N.W., Washington, D. C.

STUDENT CHAPTERS

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OHIO STATE UNIVERSITY, Columbus, O. President—Raymond E. Spence, Jr.; Secretary—Robert Borden.

OKLAHOMA A & M COLLEGE, Stillwater, Okla.

PURDUE UNIVERSITY: Lafayette, Ind. President—Allan Borken; Secretary—Stanley S. Kershaw, Jr.

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TEXAS TECHNOLOGICAL COLLEGE, Lubbock, Texas. President—Arthur Seybold; Secretary Frank N. Foster.

UNIVERSITY OF ALABAMA: University, Ala.

UNIVERSITY OF CALIFORNIA, Berkeley, Calif.

UNIVERSITY OF ILLINOIS: Urbana, Ill. President—Donald A. Jackson; Secretary—Milton F. Langer.

UNIVERSITY OF VIRGINIA: President— Robert L. Dean; Secretary—Walter S. Moore.

UTAH STATE AGRICULTURAL COLLEGE: Logan, Utah.

National Headquarters Chapters Secretary: Julia B. Godfrey

CHAPTER NEWS

jointly with the Society of Motion Picture and Television Engineers on March 27th at the Lincolnwood plant of the Bell & Howell Company. (A report of the meeting had not yet been received as SIGNAL went to press.)

Cleveland

On April 11th, Cleveland Chapter members witnessed a two-hour demonstration of equipment used by the Signal Corps in military manuevers. The demonstration was provided by a Signal mobile demonstration team furnished by the Second Army and featured the following signal equipment:

CE-11 wire dispenser W-130, DR-8 with telephone TS-10; SCR 300, SCR 536, AN/GRC 9 radio sets; AW/GRC 26 radio telephone set; AW/TRC 3 radio relay set; TC teletypewriter central office set; AN/PGC 1 teletypewriter; EE 101 ringing equipment; CF 1 telephone terminal and CF 2 telegraph terminal; SB 18/GT, BD 71, BD 72, TC 12 telephone switchboards; AN/TXC 1 facsimile equipment; RL 27 and RL 31 wire reel units.

The demonstration took place in Gray's Armory. Members met earlier for dinner at the Carter Hotel coffee shop.

Chapter members were invited to participate in a meeting of the Cleveland Association of the Phi Beta Kappa on April 28th which featured a principal speaker Dr. Robert M. Burns, chemical coordinator and director of chemical and metallurgical research for the Bell Telephone Laboratories, on the subject of "Science and Scientists in Telecommunications."

Dayton-Wright

"The History and Romance of Man's Most Important Tool—Mathematics" was the subject of an interesting and entertaining talk by Mr. Gunnar Nelson, technical director of defense programs for the National Cash Register Company, at the chapter's February 28th meeting.

Mr. Nelson was born in Stockholm, Sweden, graduated as a mechanical engineer from the Polytechnical Institute in Stockholm, taught at the University of Stockholm, and has been associated with the National Cash Register Company since coming to the U. S. in 1921. Prior to his present position, he was head of the research engineering department. His intenseness in delivering the address together with an extraordinary sense of humor contributed greatly toward an attentive audience.

CHAPTER NEWS

Above; Dayton-Wright chapter dinner meeting at the Biltmore hotel, Dayton, Ohio was enjoyed by, l-r; Wm. Hine; Mrs. Paul Clark, Mrs. Deluhery; Mrs. Pearlstone, Major General Wm. H. Turner; Mrs. Tunner; Paul Clark, chapter pres. Below: General view of dinner meeting.

The meeting took place at the Engineers' Club, with 53 members and guests present. The by-laws for the chapter which had previously been revised by the executive committee, were submitted to the membership and were unanimously approved. Additional appointments were made to various committees as follows: John Wilkinson, entertainment; Lt. Sara Windland—publicity; Harry Blackburn, membership-industrial.

Major General William H. Tunner, director of the famed Berlin airlift, gave a dramatic talk on that operation as well as on the "Hump" airlift in China during World War II and the more recent airlift in Korea which he had also directed, at the March 27th meeting.

General Tunner, who is now Deputy Commanding General of the Air Material Command at Wright-Patterson Air Force Base, pointed out that America's notable airlift was in China during World War II. An airlift from India over the treacherous Himalaya mountains and Burma and into western China was the only way the United States could keep China active in the war and keep 2,000,000 Japanese fighting our allies instead of permitting the Jap troops to move into Southwest Pacific and further complicate MacArthur's problems. "The 'Hump' convinced me and many others," the General said, "that given suitable equipment and trained men in sufficient numbers, the Air Force could carry almost anything anywhere at any time.",

As for the Berlin airlift, General Tunner commented that the United States was using its Air Force in time of peace as an unarmed political weapon to solve one of the most serious international crises of the post-war world. "The basic concept of the operation of the Berlin airlift, stated the General, "was to get the entire lift procedure down to steady, even rhythm with hundreds of airplanes doing exactly the same thing every hour, day and night, at the same persistent beat. The results indicated the soundness of this procedure and in the final four months of the operation, nine hundred round trips per day were made into the city of Berlin, carrying eight thousand daily tons of coal, food and other supplies."

As soon as the airlift operation in Korea began, General Tunner and his organization were faced with the first big job—to participate in the Inchon invasion. "There we found ourselves supplying completely the Marine Air Wing which, in that immediate locality. was doing all the air fighting. Surface transport just wasn't functioning because of the poor harbor, the extensive mud flats, and the confusion found at almost any harbor in war time. We carried all the bombs, gasoline, and food—as a matter of fact, just everything—that was used by those who participated in the air fight over the Seoul-Inchon area, as well as thousands of troops and many emergency supplies. In addition, we evacuated the wounded." From this point on, General Tunner said, airlift operations increased steadily and our troops became more and more dependent upon the Air Force's part in getting more equipment and supplies where they were needed.

In closing, the General pointed out that "the airlifts across the Pacific and in Korea go on today. The lines between our forces and the communists have stabilized but yet there are emergencies. Supplies go short and are being flown in in increasing qualities as they are required—more and more troops are being rotated by the airlift and the wounded are being evacuated." He quoted General "Iron" Mike O'Daniel as saying: "The airlift to Korea is one of the greatest developments of this war. It gives a commander advantages he has never had in wars before. The Korean airlift is doing a magnificent job in preventing shortages and I think that they are just beginning to scratch the surface on what they are eventually going to do."

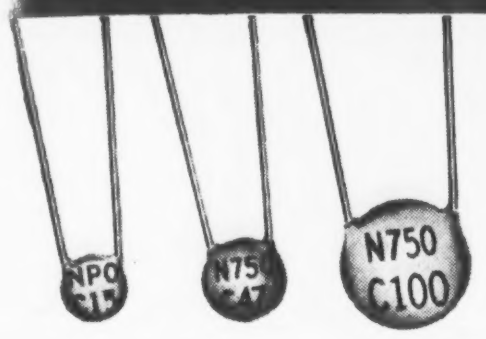
The dinner-meeting was held in the junior ballroom of the Baltimore Hotel in Dayton, with more than 110 members and guests present.

The chapter's April 24th meeting featured a talk on "Ten Years in the Far East" by a speaker who has appeared before numerous AFCA chapters this year—Howard F. Van Zandt, assistant sales manager of the Kellogg Switchboard and Supply Company.

Having served five years as telecommunications advisor on traffic matters with the civil communications section on General MacArthur's staff in Japan, Mr. Van Zandt gave a most interesting account of communications problems in that country after the war and during the period of reconstruction. He also described some of the lessons he had learned during his ten years in Japan—five years after World War I and five years after World War II—and stressed that it is essential for the success of the Mutual Defense Pact that Americans learn to understand the Japanese people, their thinking and their culture.

Details were announced of the chapter membership drive in progress until June 21st, the date of the annual picnic. A $50 bond will be awarded as first prize to the member bringing in the greatest number of new memberships,

RMC



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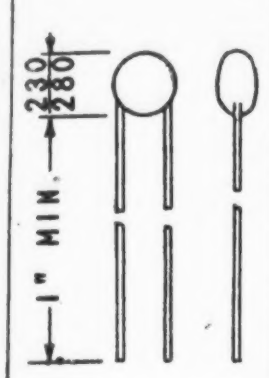
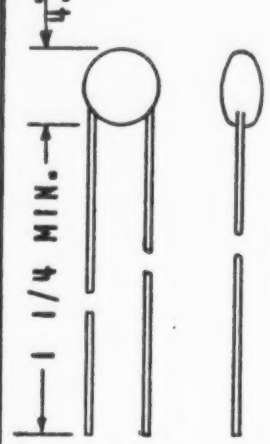


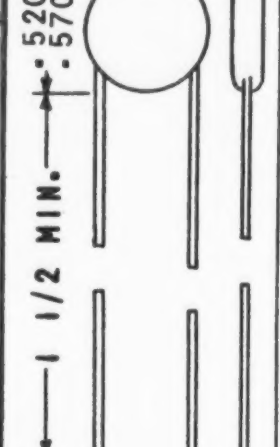
Size A

Available Range	
UUF	TC
— —	—
2 to 12	NP0
2 to 15	N33
2 to 15	N80
2 to 15	N150
2 to 15	N220
2 to 15	N330
2 to 20	N470
5 to 25	N750
15 to 50	N1400
50 to 75	N2200



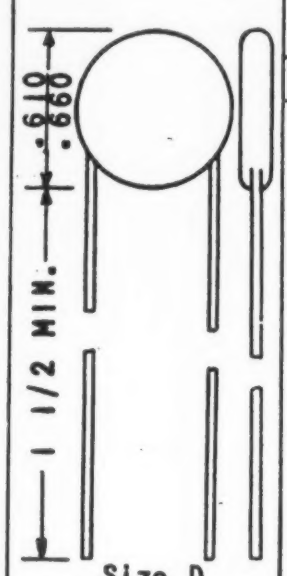
Size B

Available Range	
UUF	TC
2 to 9	P-100
13 to 27	NP0
16 to 27	N33
16 to 27	N80
16 to 30	N150
16 to 30	N220
16 to 30	N330
21 to 40	N470
26 to 50	N750
51 to 80	N1400
76 to 150	N2200



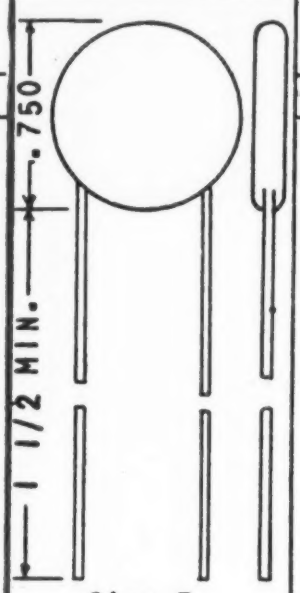
Size C

Available Range	
UUF	TC
10 to 30	P100
28 to 60	NP0
28 to 60	N33
28 to 60	N80
31 to 60	N150
31 to 75	N220
31 to 75	N330
41 to 80	N470
51 to 150	N750
81 to 200	N1400
151 to 250	N2200



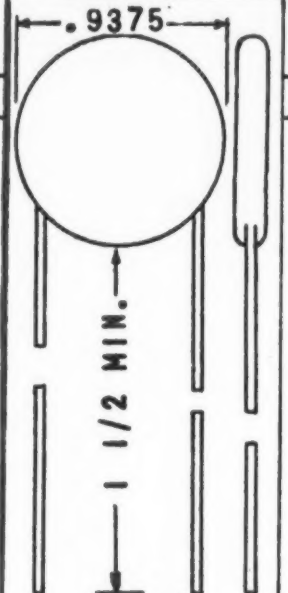
Size D

Available Range	
UUF	TC
61 to 75	NP0
61 to 75	N33
61 to 75	N80
61 to 75	N150
76 to 100	N220
76 to 100	N330
80 to 120	N470
151 to 200	N750
201 to 250	N1400
250 to 300	N2200



Size E

Available Range	
UUF	TC
76 to 110	NP0
76 to 110	N33
76 to 110	N80
76 to 110	N150
101 to 140	N220
101 to 140	N330
121 to 170	N470
201 to 290	N750
251 to 470	N1400
301 to 500	N2200



Size F

Available Range	
UUF	TC
111 to 150	NP0
111 to 150	N33
111 to 150	N80
111 to 150	N150
141 to 190	N220
141 to 190	N330
171 to 240	N470
291 to 350	N750
480 to 560	N1400
501 to 600	N2200

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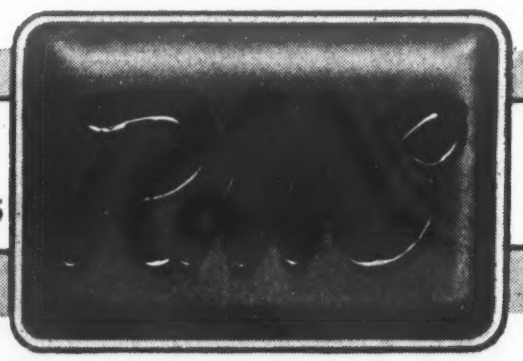

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and a $25 bond will be the second prize. Mr. Louis Herz, public information officer, director, procurement of production, Wright Field, was appointed publicity chairman of the chapter. It was unanimously voted that the Dayton-Wright Chapter accept the duties of host to the 1953 national convention should Dayton be chosen as the site of that convention at the board of directors' meeting in Philadelphia on April 25th.

Dayton - Wright February meeting, l-r; Lt. Col. R. F. Amann; Lucille Althoff, secty; Paul Clark, pres.; D. L. Pearlstone, treas.; Wm. P. McNally, program chairman. R. J. McIlrath, membership committee, John Wilkinson, entertainment.

Decatur

Eighty-five members and guests of the Decatur Chapter traveled by auto caravan to the College of Engineering, University of Illinois, at Champaign, Illinois, on March 15th, for a tour of the electrical engineering building, mechanical engineering school, physics laboratory and the betatron laboratory. Special guides were made available for detailed lectures on various experiments and demonstrations, which included radar in operation, writing with electrons, stroboscopes, invisible magnetic forces at work and oscillating motors, cyclotron laboratory, betatron, Abbott power plant, stunt show, cosmic rays, polarized light and microwaves.

The highlight of the tour was the visit to the betatron laboratory. For years, scientists tried to build a machine which could produce high-energy electrons by means of a magnetic field. They wanted these electrons—with energies of millions of volts—both for direct use and to create equally high-energy x-rays, which would have many uses. The object was accomplished July 15, 1940, at the University of Illinois by Professor Donald W. Kerst. His first machine produced 2½-million-volt x-rays. He named it "betatron" from the Greek symbol "beta", used scientifically to indicate high-energy electrons, and the suffix "tron", meaning "an instrument for." The betatron is "an instrument for producing high-energy electrons." In 1941, he completed his second betatron. It is the prototype of the 24-million-volt commercially-made betatrons now used for industrial radiography, for cancer treatment, and for scientific research. It can produce either x-rays or a free beam of electrons. Precise control of the energy is an important feature of this type of machine.

A 340-million-volt betatron for scientific research, design, and built under Professor Kerst's direction, went into operation February 15, 1950, at the University. This machine involves refinements of design so great that if the original 1940 betatron could be built in the same way its 2½-million-volt rays would come from an instrument the size of a penny matchbox. Construction of an 80-million-volt "pilot model" preceded building of the big machine.

The 340-million-volt betatron is of great value for research in nuclear physics. It can produce mesons, little-known nuclear particles which are involved in holding the atom together. It offers accurate measurement of the energy necessary to split the nucleus of all elements, and it can be used for many other scientific projects. It also aids medical science in the problem of destroying cancers without injuring other issues. It offers reduced danger of damage to healthy tissues, less radiation sickness, and shorter treatment time. High-energy betatron x-rays allow industrial engineers to save time and money by taking pictures through thick metal castings and forgings to reveal flaws before starting further work, to check the assembly of complicated mechanisms inside metal housings, and to determine the condition of machinery without taking it apart.

On March 20th, the chapter sponsored a luncheon at the Decatur Signal Depot which was attended by 75 chapter members and some 300 employees of the depot. Capt. Ishmael Gardner acted as toastmaster and introduced Col. Frank Schaal, commanding officer of the depot, Louis Yack, president of the Decatur Chapter, and Richard Crum, the guest speaker.

Mr. Crum, local Philco distributor for Central Illinois and former airborne radar representative for Philco Corporadur during World War II, discussed television, the possibility of transmitters in the local area for VHF and UHF and fringe area reception. He told the group that color television would not be available in the Decatur area for at least ten years and that UHF would not be available for some time due to technical difficulties and the short range of transmission. He also pointed out that fringe area reception of VHF would remain intermittent and not dependable for more than an average of three or four days per week depending upon atmospheric conditions and regardless of the type of receiver or antenna used until transmitting stations were located within a thirty or forty mile radius. Mr. Crum's lecture was most enlightening for all present, especially those contemplating the purchase of television receivers.

The chapter accepted fourteen new members following the luncheon and received thirty pledges.

Detroit

Howard Van Zandt of Kellogg Switchboard & Supply Company presented his lecture "Adventures in Telecommunications in Japan" before a meeting of the Greater Detroit Chapter on March 20th.

Speaking chiefly of his work in Japan, which was primarily that of

Decatur chapter members at Illinois School of Engineering. L-R standing: E. W. Cupp, Chief Inspection Supervisor; Chester Badgett, secty-treas. AFCA. Kneeling: fourth from right, Captain Arthur Drucker, Chief Storage Division.

guiding and helping the top officials of the Japanese Ministry of Telecommunications to solve the innumerable problems that arose as a result of the devastation of the war and during the period of reconstruction, Mr. Van Zandt also gave his audience an insight into the culture and philosophy of the Japanese people. He pointed out that it is essential for Americans to learn to understand the Japanese so that the two races can work together with harmony.

European

The European Chapter met in the Europa Hotel, Heidelberg, on December 12th to hold its annual meeting and elect officers for the coming year. The new officers are: president—Lt. Col. Andrew D. Stephenson, Signal Div., Hq. EUCOM; Vice-president—Lt. Cdr. J. J. Kelly; treasurer — Capt. W. Hooker, USAF communications section; secretary—George A. Spear, SigSec, Frankfurt Military Post.

The first of the AFCA medals being awarded by the European Chapter each quarter to the outstanding student attending the EUCOM Signal School was presented to S/Sgt. Andrew Zolensky, USAF Rhine Main, by Brig. Gen. R. V. D. Corput, Chief Signal Officer, EUCOM. In making the presentation, General Corput stressed the objectives of the association and pointed out that these awards were inaugurated by the European Chapter to recognize outstanding scholastic achievement among the members of the armed forces attending the EUCOM Signal School.

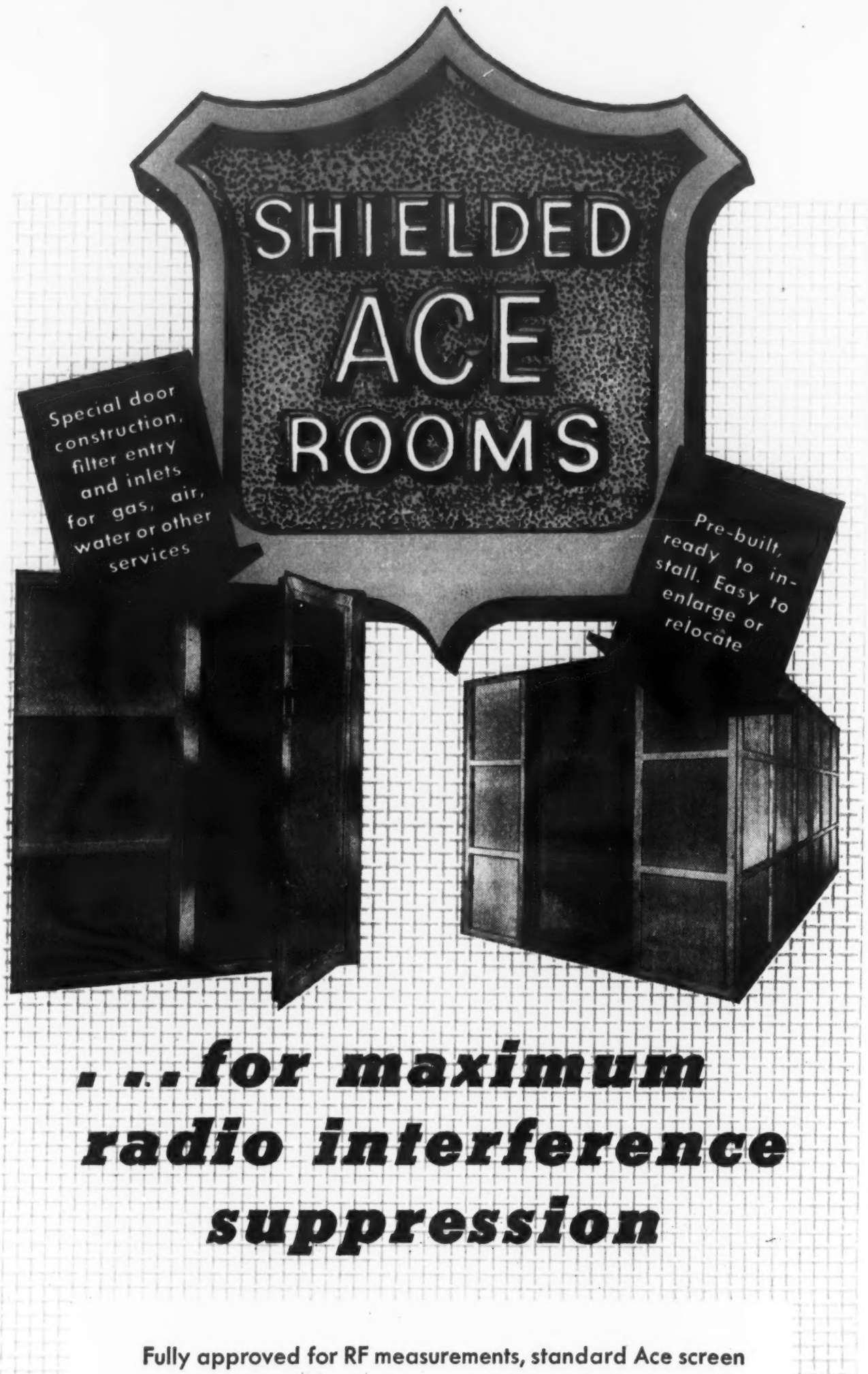
Col. Ira P. Doctor, chapter president, presided and following the election of officers turned the meeting over to the new president, Col. Stephenson. Special guest of the chapter was Lt. Col. Dulaney L. O'Roark, commandant of the EUCOM Signal School.

The winner of the medal award at the close of the second quarter of the Signal School year was Sgt. Billie F. Pate, AABn.

Members of the European Chapter are requested to submit any new addresses to George Spear, Secretary, SigSec, Frankfurt Military Post, so that they may be assured of receiving notices of all chapter meetings. While on leave in the States in April, Mr. Spear visited AFCA headquarters in Washington for a conference with Executive Secretary George Dixon on the problems and activities of the European Chapter.

Fort Monmouth

More than 200 members of the Fort Monmouth Chapter and the Monmouth County Section of the IRE held a joint dinner meeting at Gibbs Hall on April 3rd with Arthur W. Vance of the David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Sarnoff Research Center of RCA as the guest speaker.

Speaking on the subject of guided missiles and computors, Mr. Vance described the Typhoon Analogue Computor and Guided Missile System Simulator, the most extensive and accurate computor of its type, which contains over 500 computing amplifiers and about 4,000 tubes. The performance of this computor in the solution of a test problem was discussed, as well as comparisons with other possible methods of solution.

Col. E. A. Kenny, president of the AFCA chapter, served as chairman of the meeting and introduced the speaker.

Dr. E. M. Strieby of AT&T spoke at the January meeting of the Fort Monmouth chapter. Over 300 members attended the dinner meeting reported in the Mar.-Apr. SIGNAL.

Gulf Coast

Dr. M. E. Strieby, public relations and technical demonstration director of the AT&T Company, presented his well-known lecture-demonstration on television before Gulf Coast Chapter members and guests on February 15, 16 and 17 at Keesler Air Force Base. Due to the great interest evidenced, Dr. Strieby gave the lecture on three different days to accommodate the varied schedule of Keesler personnel so that a maximum number could attend.

During the two-hour lecture on television, coaxial cable and micro-wave propagation, demonstrations were introduced tracing the development of television from the 24-hole mechanical scanning disc of the late 19th century to the present electronic methods. Theoretical and practical applications of coaxial cable were thoroughly expounded and future plans for wider application of coaxial to the communications field were revealed. Dr. Strieby presented a layman's view of micro-wave propagation with demonstrations of light modulation as well as modulation of micro-wave.

Mr. Ralph S. Grist, Atlanta area representative for the Bell Telephone Co. and southeastern area representative of the AFCA, accompained Dr. Strieby.

At the monthly dinner meeting on February 18th, a number of changes in the chapter organization were announced. The resignation of Col. E. L. Wood, first vice president, due to pressing business affairs, moved up the other officers: James C. Dabney becoming first vice president, Charles F. Wilder, second vice president, and Lt. Col. Joe Beler was appointed third vice-president. The transfer of several members necessitated changes in some committees: John T. Wachs was appointed chairman of the membership committee to replace Maj. Mulcahy; Maj. James J. McMahon was made chairman of the publicity committee to replace Col. Delaney; Neil R. Dobbs was added to the membership committee. A finance committee was set up with Capt. John J. Simon as chairman and C. M. Goodyear, member. A nominating committee was appointed to select a slate of nominees for the coming annual election.

A steak dinner and a program of entertainment followed the meeting.

The technical meetings during February featured a classified discussion of electronic countermeasures; a talk on "Weather Effects on Radar Propagation" by Lt. A. G. Sanders, instructor, ground electronics officer's course, Keesler AFB; and a lecture-demonstration on the phenomena of electro-magnetic circuits by Gilbert Ludeau, educational specialist, electronics fundamentals dept., 3380th TTG.

Members of the Electronics Training Working Group, a sub-division of the Joint Panel on Training and Training Devices of the Research and Development Board, office of the Secretary of Defense, were guests at the chapter's March 3rd dinner meeting in Gus Stevens Restaurant in Biloxi. They were introduced by Chapter President John McDavid as follows: Dr. J. H. Corneilsen, Jr., of New York University, Director of the Joint Panel on Training and Training Devices; Dr. Donald W. Taylor, Stanford University, Chairman of the Electronics Training Working Group; Dr. Howard O. Johnson; Dr. P. H. Blanchard; Cdr. C. M. Pipes, USN; Capt. D. M. Schulenburg, SigC; Major Booth, USAF.

Dr. Corneilsen in discussing the Electronics Training Working Group explained that its general purpose is to review research and development work being done by the Army, Navy and Air Force in the training of electronics technicians, to discuss major problems existing in this training, and to make recommendations for further research needed to solve these problems. The group visited Kessler AFB to gain working knowledge of Air Force facilities and procedures used in training electronics maintenance personnel.

Major Richard Deane was presented the gold AFCA medal for obtaining the most new members during the national chapter membership drive last summer.

Flight Lt. Wm. R. Jones, Signal Branch, RAF, left. Col. John A. McDavid, President, Gulf Coast chapter, right.

Flight Lieutenant William R. Jones of the Signal Branch of the Royal Air Force was guest speaker at the March 17th dinner meeting.

Speaking on the Ocean Weather Ship Service, Lieut. Jones described the use of four corvettes operating out of a base on the River Clyde in Scotland. These ships have a crew of fifty and carry a great variety of communications and radar equipment. Two of the ships are out on station at one time while the other two are in port, and provisioning for the next trip. The tour on station is 28 days, approximately Southwest of Iceland. While on station, the ships have three primary functions: (1) report weather every four hours; (2) provide a mobile fix for aircraft navigation; (3) provide air-sea and marine rescue service.

The equipment used for weather reports is radio sonde balloons tracked by ten cm. radar using a parabolic antenna four feet in diameter, mounted twenty feet above the deck. The antenna may be tilted 70° in elevation. Because of the small size of the corvettes and the rough weather encountered this antenna is stabilized in azimuth and elevation. The ships use radar navigation on the way to their

TO TRIPLE THE CAPACITY OF ITS ELECTRONICS LABORATORY at Electronics Park, near Syracuse, N. Y., General Electric speeds completion of a new laboratory wing. Lights burn late as a growing army of scientists and engineers at G.E.'s modern electronics headquarters hastens development of still greater contributions to your defense and to your standard of living. From radio to radar . . . from computers to semi-conductors . . . the potential uses of the electron are explored unceasingly by these scientists at General Electric.

Your security and well-being strengthened by G-E Electronics Research in 3 great laboratories

IF you want to keep your freedom, be able to pay your taxes and have enough left for comfortable living, you have a real stake in electronics. Your security and well-being are tied to the problem of meeting staggering needs for defense without overloading the civilian economy. Only through a higher rate of industrial productivity can this be done. And only through expanded use of industrial electronics can productive efficiency reach its highest level. So you have an interest in the news that General Electric has accelerated electronics research in three laboratories: the Electronics Laboratory at Syracuse—the new Advanced Electronics Center at Cornell University—the General Electric Research Laboratory at The Knolls, near Schenectady. In the tradition of such great names as Edison, Steinmetz, Langmuir, Alexanderson, Coolidge and Whitney, G-E scientists are helping to make military and industrial electronics America's strongest weapons in war and in peace. In these fields, as in television, radio and all other far-reaching phases of electronics, you can look to General Electric for leadership.

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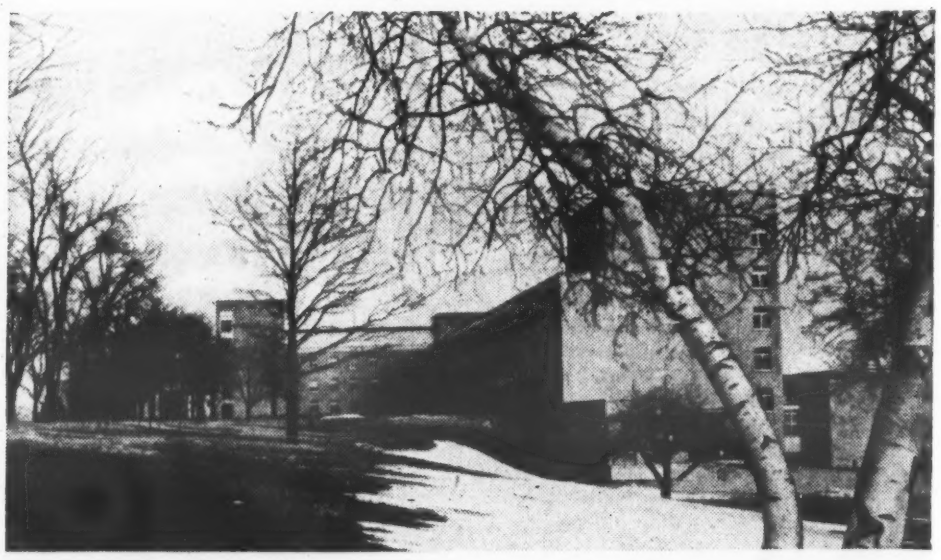
EDUCATION AND INDUSTRY JOIN HANDS IN RESEARCH in the academic atmosphere of the recently established General Electric Advanced Electronics Center at Cornell University. This unusual cooperative research enterprise links top men of creative and practical science, who probe beyond the edges of knowledge for you, for your security. Above—a research team considers a problem in radar theory.



ATOM SMASHERS, SYNCHROTRONS, AND EVERY CONCEIVABLE TOOL for electronics research are the scientific weapons of the General Electric Research Laboratory. Through the course of its brilliant 52-year history the Research Laboratory has pioneered in electronics development. Today it meets the challenge of the changing times with the most extensive program of electronics research in its lifetime.

stations during conditions of low visibility and maintain position by using Loran, coded beacons and conventional navigation methods.

Life on board these weather ships is very restricted because of the cramped quarters and the extra crew needed to operate and maintain the electronics gear. Flight Lieutenant Jones described the daily routine aboard ship and concluded his talk with several humorous anecdotes stemming from the cramped quarters and resultant discomforts of life aboard these vessels.

The other meetings held in March featured the following speakers and subjects: V. O. Smallwood, chief, curricula section, plants branch, TTG, Keesler AFB, on "Second common core training program conference report"; 1st Lt. Harry Schow, 3903rd Radar Bomb Scoring Sqdn, on "Radar Bomb Scoring"; Andrew J. Overmyer, chief, instruction branch, training analysis and development div., Keesler AFB, on "Supervision in Air Force Electronics Training Schools"; Lt. Col. Joe A. Beler, director of the MARS station at Keesler AFB, on the Military Amateur Radio System"; V. R. Muse, chief, proficiency measurements branch training analysis and development office, 3380th TTG, on "Proficiency Measurements"; Maj. Reuben A. Krutz, asst. director, airborne electronics operators dept., Keesler AFB, on "Electronics Countermeasures Training"; Harold G. Hirn, sr. instructor of branch III, electronics fundamentals dept., on "High Frequency Transmission Lines"; E. B. Bonewitz, chief, training equipment branch, training analysis and development, on "Circuit Testing with Meters and Multimeters"; Webb Dishman, educational specialist, 3380th TTG, reported on new production of electronic equipment observed on a visit to the RCA Service Co., Camden, N. J.; and C. W. Hollister, sr. instructor, electronics fundamentals dept., who accompained Mr. Dishman on his visit to RCA, described such new developments observed at RCA Laboratories, Princeton, N. J., as color TV, transistors, traveling wave tubes, infra-red tubes and electronic computers.

At a business meeting on April 17th it was announced that the winners in the recent chapter membership drive were George H. Grossnickle, first place, and Capt. Kenneth N. Harding, second, and that the gold and silver AFCA medals would be awarded them at the next regular meetings.

It was also announced that the results of the annual election, which was being conducted by mail ballot, had not yet been determined but that April 21st was the deadline for accepting votes and the new officers would be installed at the next meeting.

Two hundred and sixty-five members and guests attended the April 29th meeting at the Buena Vista Hotel, Biloxi, which climaxed the year's activities with the announcement that the Gulf Coast Chapter had won the Chapter of the Year Contest.

Prior to the meeting, a lecture and demonstration was provided by the following Philco Corporation representatives: Owen H. Klepper, Advertising and Promotion Manager of Government and Industrial Div.; John R. Booth, General Manager, TechRep Div.; Emmit Sommer, Special Rep.; John Pell, Coordinator Special Projects; and J. R. Lewis, Director of Training.

After Mr. Klepper gave an outline of the evening's program, Mr. Pell lectured on the theory and practice of microwave transmission with the aid of slides and photographs of microwave equipment produced by Philco. Mr. Sommer described the installation of the microwave communications system in Korea and supplemented his lecture with colored slides illustrating the terrain difficulties encountered, the living conditions, and the problems involved in transporting and setting up the microwave equipment. Mr. Lewis outlined the training program accomplished by the Technical Representative Division of Philco, using slides and static display of the training aids employed

The last speaker was John Booth, who summarized the preceding talks by reviewing the general program of the TechRep Division. He congratulated the chapter for winning the Chapter Contest, and also complimented the 3380th Technical Training Group, Keesler AFB, on the extent and soundness of the Air Force electronics training program. The program concluded with a movie depicting the procurement, training and assignment of the Philco TechReps.

A cocktail party and buffet supper followed the Philco program. After dinner, the regular business meeting was opened by Col. John McDavid, chapter president, with the announcement that the Gulf Coast Chapter had won the Chapter of the Year Contest. Membership Chairman John Wachs named the winners of the recent membership contest and Col. McDavid presented a gold medal to George Grossnickel for first place and a silver medal to Capt. Kenneth Harding for second place.

The results of the annual election were announced as follows: president —Lt. Col. Joe H. Beler; 1st vice- president—John Wachs; 2nd vice-president —Maj. R. P. Deane; 3rd vice-president—Lt. Col. Paul J. Slocum; secretary—Donald E. Payne; treasurer—Curtis W. Hollister. In the absence of Col. Beler, the new president, Vice President Wachs accepted the certificate awarded to the chapter at the national convention in Philadelphia, and also the chapter charter, and made a short speech of acceptance on behalf of the new officers.

At the suggestion of the retiring secretary, Major Deane, the entire membership rose and applauded Col. McDavid in appreciation of his vigorous activity while chapter president which had culminated in the award of the Chapter of the Year title.

Kansas City

Holding its first regular meeting on March 19th, the Kansas City Chapter.

Lt. Gen. R. W. Harper, introduces Maj. Gen. Raymond C. Maude, Director of Communications, USAF, Scott-St. Louis April chapter meeting. At head table l-r: Mrs. R. F. Fulton, Oliver Parks, Mrs. E. Clark, Gen. Maude, Col. W. Snouffer, chapter pres., Gen. Harper; AFCA 1951 National President, W. J. Halligan, Mrs. Snouffer and Edwin Clark. At the table but not shown in picture was Lt. Col. Howard Gee, Exec. Officer Director of Communications, USAF.

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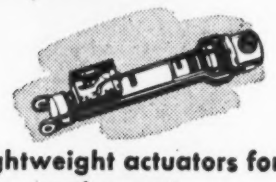

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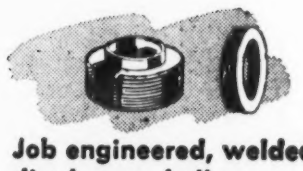
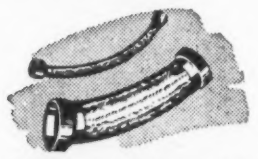


Job engineered, welded-diaphragm bellows.



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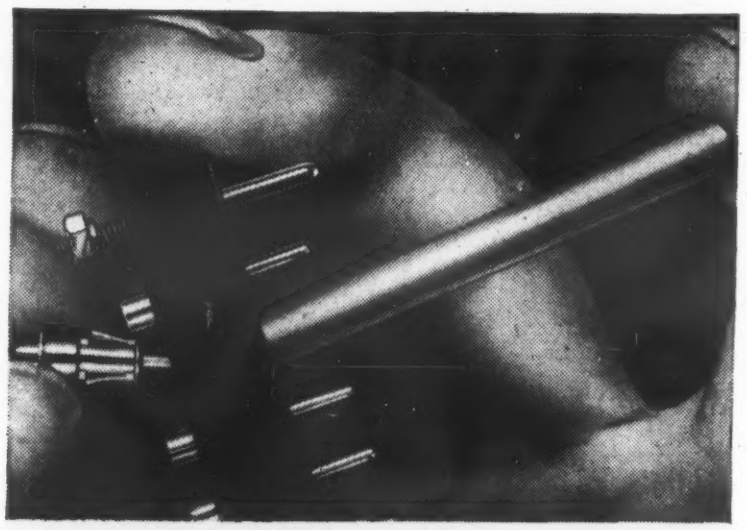


Removable pins in Breeze connectors speed soldering, save time, trouble. Pins snap back into block.

CHAPTER NEWS

AFCA's newest unit, elected the following slate of officers to head the chapter during its first year's activities: president—Vernon B. Bagnall, General Manager, Western Area Long Lines Dept., AT&T Co.; vice-presidents—Carl L. Spaid, President, United Telephone Co.; E. E. Howard, Exchange Engineer, Southwestern Bell Telephone Co.; Colonel C. S. Miller, Director of Communications and Electronics, Central Air Defense Force; treasurer—C. G. Turner, Regional Manager, Electronics Div., General Electric Co.; secretary—R. E. Conrath, Commercial Staff Supervisor, Western Area Long Lines Dept., AT&T Co.; director at large—C. L. Foster, President, Central Telephone and Radio Schools.

Following the business meeting, Col. John B. Logan, Chief of Civil Air Defense, Central Air Defense Force, spoke on the defense of the U. S. from air attack.

The dinner-meeting was held in the Junior Ballroom of the President Hotel and was attended by 69 members and guests.

Kentucky

A special message from Maj. Gen. George I. Back, Chief Signal Officer, marked the chapter's March 3rd meeting which was held to commemorate the 89th anniversary of the Signal Corps. Col. Harold T. Gallagher, chapter president, opened the meeting with a brief review of the history of the Signal Corps.

General Back's message was: "This 3rd of March marks the 89th anniversary of the Signal Corps and another year of service to our nation and its people of whom we are a part. I know from recent first hand experience in the Far East as well as here in Washington that you men and women of the Signal Corps are serving our country efficiently and diligently. You are 'Getting the Message Through' with sound research and development, adequate and timely supply, superior training and outstanding performance in all phases of Signal Corps operations. The action in Korea has proved that Signalmen are combat soldiers as well as communications, electronics and photographic professionals.

Scott-St. Louis March meeting. L-R, front row; C. G. Wassal; Maj. W. G. Savacool, R. W. Woodward of Eastman Kodak, whose film, "Functional Photography in Industry" was featured at meeting; Rear Admiral R. E. Melling, Ret.; Back row: Allan Eisenmayer, M. A. Ebinger, L. Dechant, Lt. Col. Richard Conrad.

"Much of our success is directly attributable to the unusual spirit of cooperation existing within our organization as to the high degree of competence and skill throughout. I am sincerely grateful for the loyalty of each of you—civilians, enlisted men, WACS, officers—during the past year. Because of your support, it is with a feeling of deep gratitude that I know I may look forward to even greater strides within the Signal Corps in the future."

A "Mad Hatters" program, dedicated to the feminine members of the chapter, featured the March 12th luncheon. The ladies created hats from lampshades, boxes, and various and sundry material. A local store was represented by a commentator who brought along hats which were modeled by the ladies present. A $15 gift certificate was awarded Miss Ellen Bruner for the most original and becoming hat. Her chapeau was a "French creation," featuring Easter eggs, veiling and colored plastic toothpicks. Another hat which created a lively interest was made by Mrs. Camille McCarty. It was made to resemble a cake and depicted the 89th anniversary of the Signal Corps.

The "Mad Hatters" program drew the largest audience yet to attend a luncheon meeting, with 204 members and guests present.

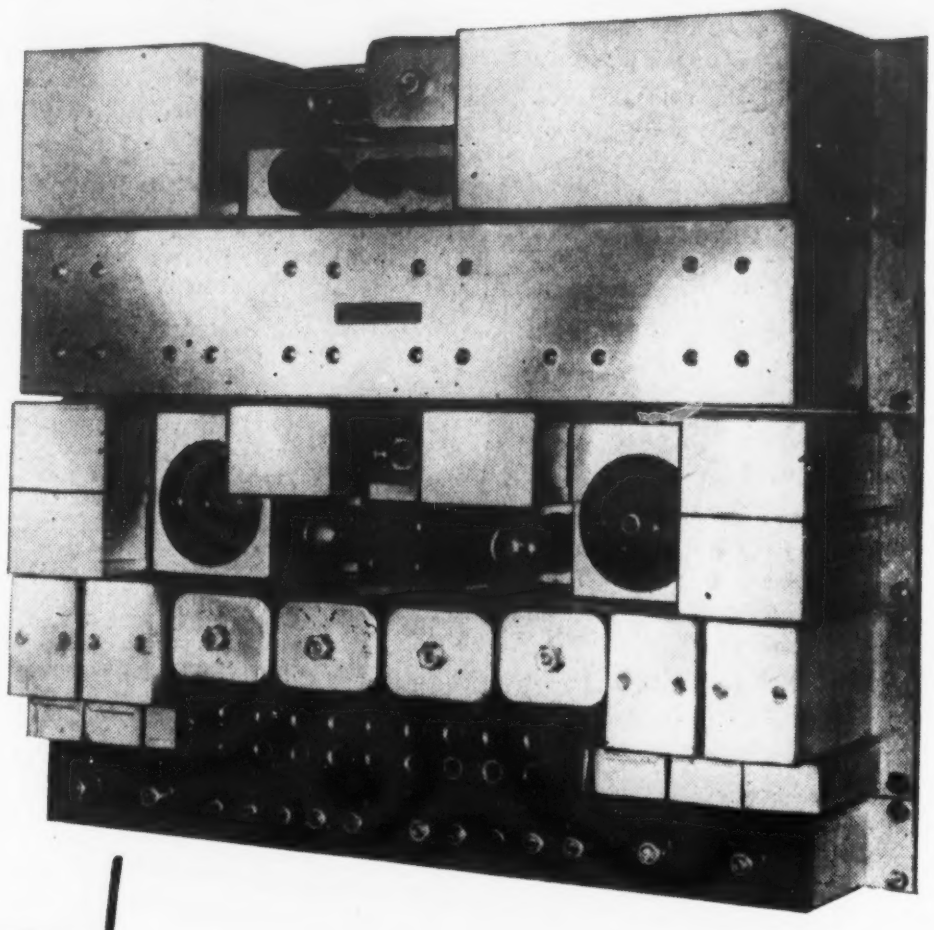
Meeting in the railroad dispatcher's office at the depot roundhouse on March 13th, members heard Charles D. Sayre, chief of the communications branch of the depot, explain and demonstrate the two-way radio system recently installed at the depot. This system has a fixed station located at the dispatcher's office and a mobile unit in each of two switch engines, thereby enabling direction of their activities from the dispatcher's office. It was pointed out that the installation would result in a considerable savings of time and money in the operation of the switch engines. Another potential use of the two-way radio system discussed was its use in the event of fire, enemy attack or other emergency.

Lt. Herbert A. Scheibler, assistant chief of the station liaison office, Lexington Signal Depot, explained the functions of his office at the March 14th meeting. He said the station liaison office is a connecting link between the depot and the various camps, posts and

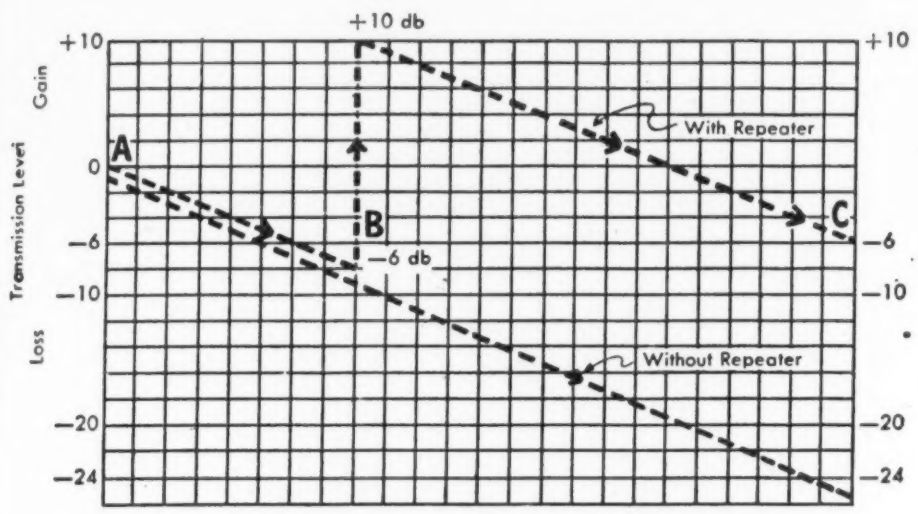
Mr. Grossnickle obtained thirty-nine members and won the gold medal award. Col. McDavid, President of Gulf Coast chapter, presents it at April meeting.

Colonel McDavid presents Capt. Harding the silver medal awarded for second place in Gulf Coast membership contest.

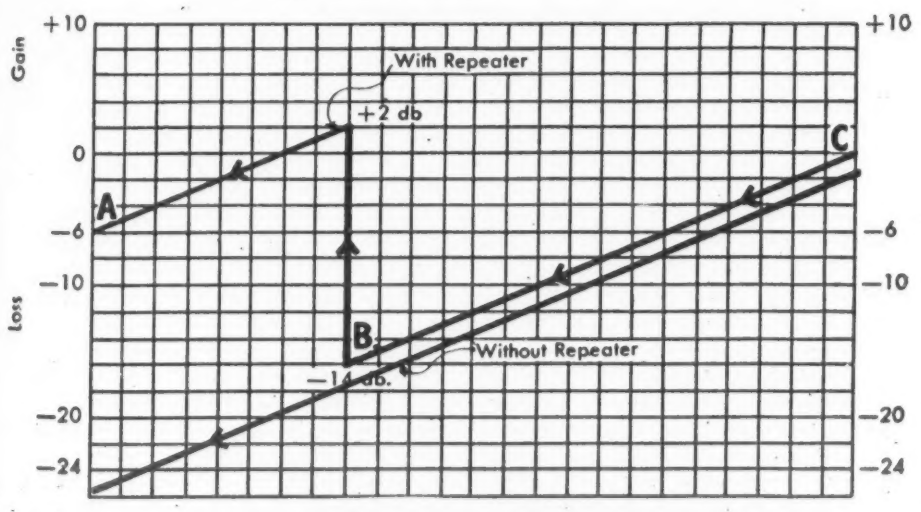
Get Your Telephone Circuits "Out of the Mud" with KELLOGG Repeater



TRANSMISSION LEVEL DIAGRAMS OF A LINE 24db LONG MEASURED AT 1KC WITH AND WITHOUT REPEATER



WEST-EAST TRANSMISSION



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TYPE OF CIRCUIT	LENGTH OF CIRCUIT MILES	LOSS AT 1 KC-db
104 Copper O.W.	288	24
104 Copper Steel 40% O.W.	133	24
109 Galvanized Steel O.W.	77	24
16 Ga. Non-Loaded Quadded Cable	32	24
19 Ga. Non-Loaded Quadded Cable	22	24
22 Ga. Non-Loaded Cable	13	24

All circuits are side circuits. Attenuation computed on basis of wet weather with insulators in good condition, and no large impedance discontinuities.

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REPEATER

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stations within the mission area of the depot. The station liaison teams visit within the mission area, review their supply requirements, point out to the stations when they are accumulating excessive amounts of stock and request it be returned to the depot for redistribution. They also review, revise and/or approve station control levels in line with current requirements, inspect station supply records and supply activities to assure compliance with the basic principles of efficient stock control, and perform any other related functions to assure that the technical service interest and the responsibility of the Chief Signal Officer is properly recognized and carried out by the stations.

The chapter held a dinner meeting on March 26th in conjunction with the depot commanders' conference which was being held at the Lexington Signal Depot. Mr. Charles K. O'Connell, Kentucky's Secretary of State, was the guest speaker.

Brief talks were also given by Brig. Gen. Victor A. Conrad, chief, and Col. Albert F. Cassevant, assist. chief, procurement and distribution division, OCSigO, and Mr. LeRoy Miles, vice-president of the Chamber of Commerce. The dinner-meeting was given in the Campbell House, Lexington, with an attendance of 150.

Dr. W. Brooks Hamilton of the University of Kentucky addressed the March 28th luncheon meeting on the subject of "Advances in Modern Photography." He spoke on cameras, film, and developers, and also mentioned the large part photography has played in television.

Other meetings held in March featured the following programs: Maj. Eldon W. Schmid, National Guard instructor, 441st field artillery battalion, reported on his tour of duty in Korea; Harold W. Fann, instructor, new equipment training school, Lexington Signal Depot, described the new radiac equipment; Mrs. Emma May Frank launched the annual Red Cross drive; Irish ballads on St. Patrick's Day; Charles C. Shaw, training staff of the signal depot, discussed old and new Signal Corps equipment; Lt. Col. Luther J. Ross, deputy commanding officer of the depot, stressed the importance of "cost consciousness" at the depot; George C. Staed explained the functions of the Credit Union of which he is president; a visit to the transportation division of the depot; J. T. DeLisle of the depot training section described the characteristics of the new AN/GRC-3-8 standardized radio series; William Hirst, supervisor of the crystal shop of the depot explained and demonstrated the process of fabricating and testing crystals; James O. Sherrard, asst. comptroller of the depot, explained the functions of the comptroller's department.

At the April 9th luncheon, Colonel Gallagher, chapter president, announced that the Kentucky Chapter had won second place in the Chapter of the Year Contest. He thanked the chapter members for their loyal support and presented the following awards:

The AFCA gold medal to Mrs. Mary Steffens, stock control division, for recruiting the highest number of new members; the silver medal to D. W. Freeman, inspection department, for second place in the number of new members; a gold AFCA lapel button to Maj. Norman Miller for a wonderful job as chairman of the membership committee; a gold lapel button to Mrs. Emma May Frank for table decorations.

Following the awards. William Q. Stacy presented Col. Gallagher with a gold lapel button on behalf of the members of the chapter.

George W. Hubley, Jr., Executive Director of the Kentucky Industrial and Agricultural Development Board, addressed the April 23rd luncheon meeting. With the assistance of Eugene L. Colcord, Jr., Small Business Representative, Frankfort, Ky., slides were shown depicting the industrial development in the State of Kentucky. Mr. Hubley said the Lexington Signal Depot represents the type of expansion which Kentucky has needed for 100 years of her 150 years' existence. He also told of some of the new industries which are to open branches and factories in Kentucky and of others who are considering Kentucky as a possible site for their expansion programs.

New York

Rear Admiral William B. Ammon, in his first public appearance since becoming Director, Naval Communications, delivered the principal address at the chapter's March 26th meeting.

Speaking on "Public Relations Problems in Naval Communications," Admiral Ammon pointed out the two considerations which sometimes give rise to conflicts—keeping the public informed and at the same time maintaining adequate security—and emphasized that the AFCA can do much to promote understanding and to give public assurance that team play is the keynote of the Naval communications effort. Saying that "if the people have the information they need they will make the right decision," Admiral Ammon stated some of the things the public should know about Naval communications: the effective use made of funds appropriated by Congress; the high state of efficiency resulting from the methods and equipments adopted; and the proficiency and high morale of personnel.

The admiral suggested that the AFCA could help by extending recognition to service men and women of all ranks who have demonstrated special competence in their work. As an example of how such recognition can be extended, he referred to a request from the Ohio Bell Telephone Company for photographs and material on Ohio Bell employees on active duty with the Navy for publication in the company's magazine. He urged the AFCA to aid in bringing out and calling attention to technical needs in service communications where industry and science can be of assistance.

Col. George P. Dixon, National Executive Secretary, gave an account of his visit to west coast AFCA chapters and briefly reviewed the results of operation at national headquarters during the past years as well as future plans.

Col. T. L. Bartlett of RCA, chapter president, announced that the following members would serve as Council members at the national AFCA convention in Philadelphia: Vice Adm. W. S. Anderson, Maj. Gen. H. C. Ingles, Brig. Gen. A. W. Marriner, Rear Adm. S. F. Patten, Mr. H. J. Schroll, Col. V. N. Philip, Maj. T. N. Pope and Col. D. Talley. Alternate delegates: Messrs. P. Rosenberg, E. R. Shute, W. L. Hallahan, D. F. McClure, D. Bellare and

Kansas City chapter of AFCA had a fine turn-out for their dinner meeting.

L-R: C. L. Foster, director of Kansas City chapter; R. E. Conrath; C. G. Turner; V. B. Bagnall, president; C. L. Spaid; E. E. Howard, with recently presented chapter charter.

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JAN-I-8 STYLE No.	ALCO PART NUMBER STAMPED	BULLETIN PAGE No.	ALCO PART STAMPED NEW	ALCO PART STAMPED NEW	ALCO PART STAMPED NEW	ALCO PART STAMPED NEW	REMARKS
0104	1700	8	E-15797	E-13403	E-16001		Non-standard items listed in this Bulletin can be supplied to customer's specifications if necessary.
0105	1702	8	E-15085	E-13400	E-16017		
0106	1704	8	E-14843	E-13401	E-16000		
0108	1706	8	E-13498	E-13402	E-16010		
0110	1708	8	E-13499	E-13429	E-16021		
0112	1709	8	E-13500	E-13417	E-16022		
0116	1711	8	E-13501	E-13430	E-16023		
0204	1400	8	E-13502	E-13454	E-16024		
0205	1405	8	E-14846	E-13404	E-16018		
0206	1402	8	E-13465	E-13405	E-16008		
0208	1000	8	E-14842	E-13425	E-16013		
0210	1001	8	E-13503	E-13431	E-16011		
0212	1002	8	E-21361	E-13424	E-16012		
0216	1003	8	E-13504	E-13432	E-16025		
0220	1004	8	E-13506	E-13433	E-16026		

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BULLETIN NUMBER 512

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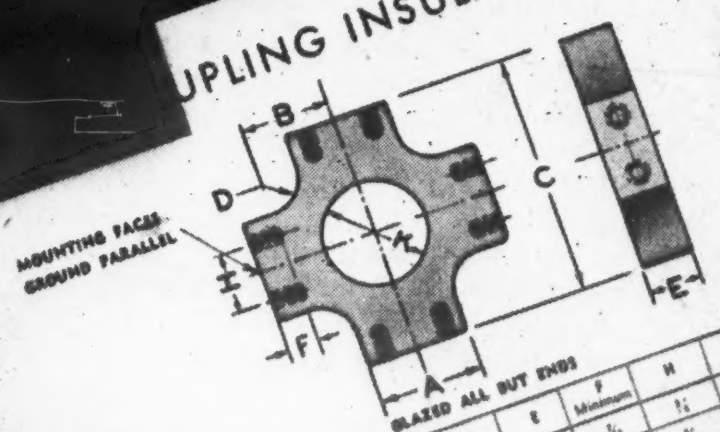

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Col. F. E. Kidwell.

At a review of the combined Army and Air Force ROTC units at New York University on May 2nd, Col. Bartlett presented the AFCA gold, silver and bronze medals to the outstanding senior, junior and sophomore communications cadets.

Following the ceremony, a meeting was held of the AFCA Student Chapter at New York University, at which Col. Bartlett spoke on the importance of the mission of the AFCA in the light of present world conditions threatening national security.

Philadelphia

The chapter's activities during March and April were devoted to preparations for the national convention. The outstanding success of all phases of the annual meeting was evidence of the excellent planning and the hard work which went on during these months.

Pittsburgh

The Copperweld Steel Company tour scheduled for the chapter's February meeting had to be cancelled due to the month-long strike of the company's steelworkers. A business meeting was substituted in its place. The report of the nominating committee was submitted with voting to be conducted by mail ballot.

The March 11th meeting featured a tour of the new United States Steel Building in the heart of Pittsburgh. Groups were formed and escorted to the top floors where the telegraph control board and telephone switchboard are located.

Following dinner, Chapter President Sylvester Stoehr introduced Hays C. Stevens, chief of communications for U. S. Steel, who explained the new building was planned for better service to new customers, for more closely knit operating procedures and for improved unification of U. S. Steel's integrated services.

Special representatives of the Western Union Telegraph Company were on hand to describe the telegraph set-up in the building where "electric brains" activated by automatic push button controls are an outstanding feature.

It was an interesting and instructive tour of a building where everything from pencil sharpeners to structural beams had been made of steel, not only in the designing, constructing and equipping of the building itself but in hundreds of other items of everyday use.

The Bell Telephone Company of Pennsylvania was host to the chapter at its Headquarters Building on April 17th. Mr. J. C. Longstreth, Vice President and General Manager of the company, welcomed the 134 members and guests and gave a descriptive talk on the nationwide toll dialing system and the facilities in Pittsburgh.

Divided into small groups, the members were conducted on a tour where the equipment necessary to translate codes, select routes and transmit all types of dialing signals was explained and demonstrated. The same equipment provides automatic switching both for toll traffic into Pittsburgh and for toll traffic routed through Pittsburgh. The tour also included a visit to the battery and power rooms, and the toll operating room where as many as 254 operators, during peak load, handle calls from Pittsburgh subscribers for completion to distant cities.

Chapter members were guests of the Bell Telephone Company at a delicious chicken dinner served in the company dining room prior to the meeting.

Colonel Walter Godard, member of the staff and faculty of the Industrial War College addressed recent meeting of Philadelphia chapter.

Sacramento

The Western Pacific Railroad Depot in Sacramento was visited by the chapter on March 26th.

Members were conducted through the traffic control rooms where they observed the actual operation of controlling trains by means of electronic devices. Mr. Thompson, electronic engineer of the Western Pacific Railroad, explained the procedure in detail and pointed out many interesting features involved in the electronic control of a railroad operation.

San Francisco

The chapter's board of directors met on March 27th at the El Jardin Restaurant. The following directors were present: Col. Lloyd C. Parsons, president; C. L. Wickstrom; E. C. Underwood; S. N. Barton; T. H. Dooling; W. R. Patton; H. L. Schnoor. Also present were: W. G. Damerow, secretary; committee chairmen Lt. Col. Claude E. Taylor, Thomas D. Razovich, Horace E. Corey and S. R. Irwin, and Jack Kaufman.

Col. Parsons expressed the thought that since regular chapter meetings were held at two-month intervals, it would be a good plan to hold interbetween meetings of the board members and committee chairmen in order to keep up interest in the AFCA and do more planning for future meetings.

Harry E. Austin of RCA Communications, past president of the chapter, and Jack Kaufman of Lewis & Kaufman were elected chapter representatives on the national council of the association.

Considerable discussion was devoted to plans for future meetings and suggested changes in the chapter constitution.

Scott-St. Louis

The Eastman Kodak film, "Functional Photography in Industry," which has been used as program material by many other AFCA chapters with much success, was the highlight of the March 7th meeting of the Scott-St. Louis Chapter. Mr. R. W. Woodward of Eastman Kodak gave a brief introductory talk before the showing of the film.

The film, an outstanding technical achievement in itself, gave members an insight into the vast field of photography as applied to numerous industrial and military operations. The extensive use of microfilming for records and reproduction of drawings and specifications was illustrated. High speed photography and the service it is rendering to analysis of manufacturing operations, the part played in industrial training by photography and its vital role in atomic research were some of the highlights. The film was considered particularly valuable in orientation of the chapter members on the role of photography and pointed out clearly its relationship to communications and electronics.

The dinner-meeting was held in the Elks Club in Belleville, Ill. Among the 90 members present was Rear Admiral Robert E. Melling, USN(Ret.), formerly of the South Carolina Chapter, who was attending his first meeting as a member of the Scott-St. Louis unit.

Maj. General Raymond C. Maude, Director of Communications, USAF was the principal speaker at the chapter's April 11th meeting. He discussed the Air Force communications-electronics program and pointed out that the present communications needs of the Air Force in the Korean effort are being met with World War II equipment. He outlined the extensive efforts and plans for further communications developments describing the features of the GLOBECOM program, the AC&W installations, the need for development of electronic countermeasures devices, and the program of conversion from VHF to UHF for aircraft communication. Citing the problems encountered in carrying out these programs, General Maude commended Industry for its splendid cooperation and contributions in engineering and production. He also complimented the Scott-St. Louis Chapter on its excellent progress since its organization.

One of the features contributing to the outstanding success of the meeting was that of making it "couples night"

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CHAPTER NEWS

and inviting wives or girl friends. The results were so favorable that strong consideration is being given toward making it a chapter policy to hold an occasional meeting for the better halves and providing a program that will be of interest to all. This was definitely carried out at the April meeting.

After an informal social hour, an excellent meal was served to 190 members and guests who were allowed their choice of menu to fit taste and pocketbook. Following this, Col. Bill Snouffer, chapter president, demonstrated how a "quickie" business meeting can be handled without taking time from the features of the program. This out of the way, he introduced Lt. General Robert W. Harper, Commanding General of the Air Training Command, USAF, who presented General Maude to the audience.

At the conclusion of General Maude's talk, Colonel Snouffer cited the part General Harper had played in encouraging personnel of Scott Air Force Base to organize an AFCA chapter. He then announced that General Harper was being made an honorary charter member of the chapter and presented him with a membership pin and, removing a mask from the charter membership plaque of the chapter, showed the addition of General Harper's name as an honorary charter member.

The meeting was climaxed by the entertaining Bell Telephone demonstration, "Scientific Magic and Your Telephone." By use of numerous gadgets and masterful showmanship, Irvin Mattick and Morton Cummings of Southwestern Bell Telephone demonstrated various telephone principles, straight wire and coaxial cables, crystals and crystal filters, thermistors, vacuum tubes, and scrambled speech. By enlisting the aid of members of the audience, telephone messages were sent across the room by means of "human" telephone lines. Irvin Mattick kept the audience in laughter with such features as speaking through a microphone held against his "tall" forehead or showing how much easier it is to turn off the room lights by blowing on a thermal device than throwing a switch. The chapter is especially grateful to Clifford Wassal, defense activities engineer of Southwestern Bell, for his efforts in making this program possible and for the splendid representation of officials from his company.

In addition to General Maude and General Harper, the chapter was honored with the presence of Lt. Col. Howard S. Gee, Executive Officer, Director of Communications, USAF; William J. Halligan, National President of AFCA and President of Hallicrafters Co.; Mr. and Mrs. Oliver L. Parks of Parks Airport; Col. and Mrs. Robert F. Fulton, Base Commander, Scott Air Force Base; and officials of Southwestern Bell including Mr. and Mrs. E. M. Clark, President; Mr. and Mrs. J. M. Black, Operating Vice President; Mr. and Mrs. H. R. Towles, General Manager; Mr. and Mrs. J. H. Smith, Jr., General Commercial Manager; Mr. and Mrs. C. G. Wassall; Mr. and Mrs. W. O. Douglass; and Mr. O. D. Meyer

Seattle

Capt. Charles Pierce of the Coast and Geodetic Survey described the modern highly accurate electronic methods used in coast survey work at the March 12th meeting. He exhibited a chart illustrating the methods used in obtaining accurate results under foggy conditions and out of sight of shore, and answered numerous questions from members of the audience. He extended an invitation to AFCA members and guests to visit the Coast and Geodetic Survey ship "Pathfinder" at present docked in Seattle.

There were numerous items of discussion during the business portion of the meeting. Col. C. D. Lawrence, past president of the chapter, emphasized the importance of AFCA to the services and to the industry. Cdr. Lester M. Hill made a motion which was seconded and passed, that a financial report, secretary's report and other pertinent items of business be outlined in the meeting announcements by mail so that the chapter meetings could be devoted in greater degree to fellowship and program.

Major Svend C. Hansen, Chief of Operations of the Alaskan Communications Systems, had charge of the program for the April 9th meeting. He gave an interesting account of the history of the ACS from its start at the beginning of the century, with special emphasis on the great change in communications which have taken place since that time. During that period, the ACS has developed from manual telegraph operation over a single circuit to a multiplicity of circuits today utilizing all the most modern methods of telephone and telegraph communications over ocean cable, radio and landline circuits.

Lt. Col. Louis A. Uslin, Telephone Engineering Officer of ACS, outlined the extent of the ACS telephone landline and switching facilities and some of the expansion currently underway. Lt. Col. Lawrence, Chief of the Procurement Division of ACS, announced that a bulletin board is to be placed in the Federal Office Building on which Signal Corps invitations for bids for the entire country will be posted for the information of suppliers.

The chapter voted to accept the invitation of Cdr. L. M. Hill, commanding officer, U. S. Naval Communications Station, 13th Naval District, to visit the Navy's "Jim Creek" project in June. It was also voted to accept the invitation of Capt. F. K. Johnson, Captain of the Port, to hold a future meeting on the Coast Guard barge at Pier 70.

South Carolina

The South Carolina Chapter met for

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a dinner-business meeting at the VFW Club in Columbia on March 13th. Capt. Henry W. McCarley, chapter president, opened the meeting with an outline of suggested programs for the coming year and urged every member to exert every effort to interest other people in joining the association.

Since its organization, the chapter had been functioning without a constitution and by-laws. To correct this situation, President McCarley had appointed a constitution and by-laws committee upon taking office as president in February. The chairman of this committee, Thomas H. Stokes of Southern Bell, presented a suggested constitution and by-laws which was read by Chapter Secretary Carl Newman and formally adopted by the members.

Considerable discussion arose concerning the frequency and time of meetings. It was finally decided to hold monthly meetings during the second week of the month, with the exact date to be set by the meeting committee. It was further decided to rotate the meetings between Columbia, Greenville and Charleston.

F. E. Warren-Cheyenne

The chapter held a business meeting in the conference room of the Mountain States Telephone and Telegraph Company on March 3rd with Lt. Col. Norman Fertig, chapter president, presiding.

Bertram H. Mineman of F. E. Warren Air Force Base was elected chapter treasurer to succeed Capt. Owen Jacoby who had been transferred. John W. Perkins of the Mountain States T&T Co. was appointed publicity chairman to replace George Humphreys who had also moved from the area.

A suggested set of by-laws for the chapter were read and, after several changes were made, were formally approved. The chapter constitution had been adopted at the December meeting.

President Fertig and William Evans of Mountain States T&T Co. were elected to represent the chapter on the national council of the association. The chapter also voted to help defray the expenses of President Fertig as chapter delegate to the national convention in Philadelphia.

STUDENT CHAPTERS

New York University

The present officers of the student chapter are: president—Marvin Polan; vice-president — Harry Schlegelmilch; secretary—Harold Barjian.

Guest speaker at the chapter's May 2nd meeting, which followed the annual military review, was Col. T. L. Bartlett, President of the New York Chapter.

Purdue University

New officers were elected at a meeting on February 20th as follows: president—Allan Borken; vice-president—Fred Bailey; secretary — treasurer — Stanley S. Kershaw, Jr.

Colonel Edwin R. Petzing, CO Signal Corps Engineering Laboratories, Ft. Monmouth; Francis Engel, RCA Victor Division, Washington office; Brigadier General James D. O'Connell, were among the guests at the National Convention.

University of Virginia

A student chapter was recently organized at the University of Virginia through the efforts of Major Arnold L. Hall, Asst. PMS&T, who has been active in AFCA affairs for some time, having served as vice-president of the Pittsburgh Chapter during his previous tour of duty at Carnegie Tech.

Chapter officers are: president — Robert L. Dean; vice-president—Russell D. Mooney, Jr.; secretary—Walter S. Moore; treasurer — Wheat Wallenborn; reporter—Harold D. Orville.

The chapter is moving into full swing with bi-weekly meetings. Amateur and MARS radio stations have already been installed by the Signal Corps ROTC unit. For anyone who may be interested, the call number of the MARS station is AA4WDA and that of the amateur station K4WDA.

In addition to the regular meetings, the chapter is planning a tour of the local telephone company to see some of the more technical aspects of communication.

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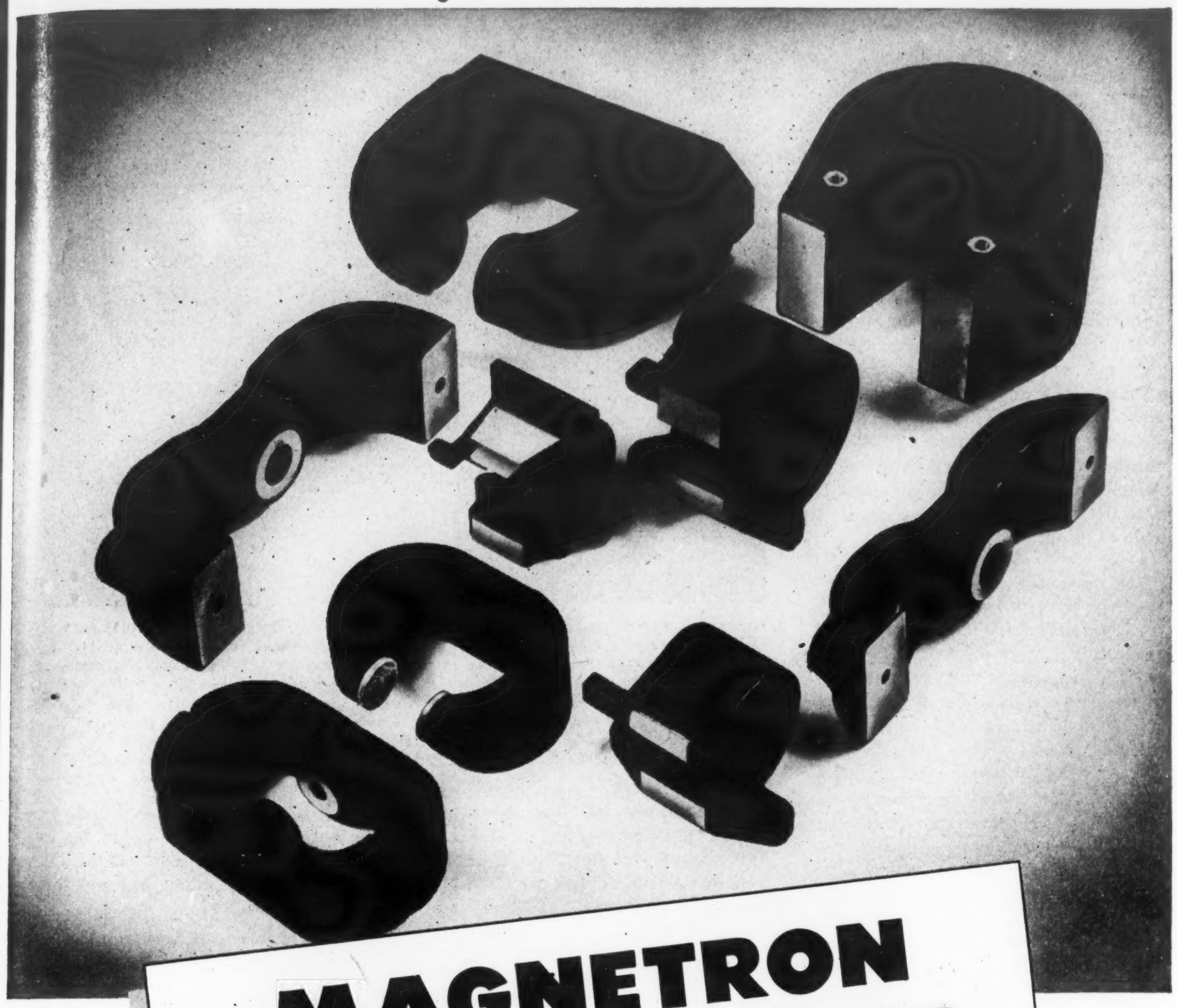

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NEWS

Communications-Electronics-Photography

World Telecommunications Developments

British to Probe Radiotelegraphy Interference by Small Electric Motors

The appointment by British Postmaster General Lord de la Warr of a 22-member advisory committee to consider what requirements are necessary to mitigate interference with radiotelegraph operations by small electric motors has been reported in a recent State Department dispatch from London.

Radiotelephone Service Inaugurated Between New Caledonia and Tahiti

A new radiotelephone circuit, spanning almost 3000 miles of the southern Pacific Ocean, has been inaugurated between Noumea, New Caledonia, and Papeete, Tahiti, American consular officials in New Caledonia have reported to the U. S. State Department. All telephone calls over the new circuit originating in New Caledonia must be placed with the government's Postal, Telephone & Telegraph Service central office in Noumea, and patrons must arrange 24 hours in advance for a preliminary appointment call. A speech "scrambling" device is being used over the circuit so conversations cannot be intercepted by ordinary radio receivers, the consular dispatch pointed out.

British Broadcasting Corp. Charter Extension Seen While New Charter is Being Prepared

With the British government under considerable pressure to allow some measure of program-sponsoring and reluctant to offer a new British Broadcasting Corp. charter before the question has been studied in detail, British press reports have indicated that a new BBC charter, which was to have been presented to Parliament last year, will not be ready by June 30 when the BCC's current six-months charter extension will expire.

Long Ranger Transmission of Very High Frequency Signals—Point to Point Service

A method of sending very high frequency radio signals, in the area of 50 megacycles, over long distances, with potential important effects in easing the shortage of frequencies for long-distance point-to-point communications and providing greater range for microwave and mobile services, was made public the week of April 28th.

Assembled above are fourteen of the top, senior, Air Force Communications-Electronics Officers who met recently in the Pentagon for an overview of their activities within the Air Force on a world-wide scale. These men are directing the Air Force's C-E program from Headquarters and the major air commands. Seated, L-R: Brig. Gen. Ludlow Bryan; Maj. Gen. Grandison Gardner, Chairman; Joint Air Defense Board; Maj. Gen. Raymond C. Maude; Maj. Gen. Roy H. Lynn; Brig. Gen. Blair E. Garland. Standing, l-r: Colonels C. E. McBrayer, C. M. Gordon, G. B. Hoffman, David C Schlenker, J. K. Dearmond, W. Snouffer, G. H. Rockey, L. N. Palmer, P. Moen (Colonel John Bestic not shown).

Details of the research project, conducted by the National Bureau of Standards, the Collins Radio Co., and a group of scientists working with the State Department, are slated to be published in the up-coming issue of the Physical Review, the journal of the American Physical Society, probably the week of May 5th.

In the tests, directional signals sent from Cedar Rapids, Ia., on 49.8 mc for more than a year have been received consistently 800 miles away, at Sterling, Va., regardless of time of day, atmospheric conditions, or season of the year, it was reported.

The transmission system uses a new approach to the E layer of the ionosphere, heretofore considered a bar to long-distance use of the very high frequencies. Under the new "scattering" theory, the scientists capitalize on ionospheric irregularities and use them as a mirror to reflect the signals. It was said that to date the practical range of the transmission has been 1200 miles, but that transatlantic transmission could be established in two jumps by use of a relay station on Greenland or Labrador.

Although technical details were not fully disclosed, it was reported that the Cedar Rapids station has been picked up by a number of radio amateurs, who said that the outlet had employed frequency shift keying, as well as amplitude and frequency modulation.

For point-to-point communications, it was noted that the new approach to ionospheric disturbances could mean that a transmitter could remain on a single frequency, instead of using several at different times of the day or year or under varying conditions. The resultant frequency economy, plus the opening up of new frequencies usable for communications other than "line of sight," could be highly significant in time, it is felt.

The scientists discounted any immediate use of the signal method for transatlantic television, because of fluctuations, but indicated that it is presently usable for voice or telegraphic communications.

THIS DEPARTMENT'S PRINCIPAL SOURCE

Telecommunications Reports

Roland C. Davies, Editor
National Press Building
Washington, D. C.

A portion of the new theory had been reported earlier by the Bureau of Standards.

Dr. Edward M. Purcell, Professor of Physics at Harvard University, directed the group of scientists who worked on the new method. A number of other scientists, including several from the Bureau of Standards, were active in the project.

Signal Corps Advisory Council Formed

The Army Signal Corps announced April 11, the recent formation of a Signal Corps Research and Development Advisory Council composed of leaders in the scientific world.

Chairman of the council is Major General George I. Back, Chief Signal Officer of the Army. Other members are:

Assistant to the Chairman, Dr. W. R. G. Baker, Vice President and General Manager, Electronics Division, General Electric Company, Syracuse, New York;

Dr. A. F. Spilhaus, Dean of the Institute of Technology, University of Minnesota, Minneapolis, Minnesota;

Dr. A. G. Hill, Director of the Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts;

Dr. James W. McRae, Vice President, Bell Telephone Laboratories, New York City;

Mr. David B. Smith, Vice President, Philco Corporation, Philadelphia, Pennsylvania;

Mr. Ralph S. Holmes, Director, Contractor Research Laboratory, RCA, Princeton, New Jersey; and

Mr. W. R. Hewlett, Vice President, Hewlett Packard Company, Palo Alto, California.

The Advisory Council met in the Pentagon April 9 and 10 to discuss Signal Corps research and development problems.

General Elder of Signal Corps Honored on Retirement

Brigadier General Eugene V. Elder, former Chief of the Procurement and Distribution Division, Office of the Chief Signal Officer, retired from the Army April 30 and was honored on the occasion by his colleagues in the Armed Services with a simple reception in the Pentagon.

During the month of May, General

AMERICAN CHEMICAL PAINT COMPANY

AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet

Subject: HOW TO MAKE PAINT STICK TO GALVANIZED IRON WITH LITHOFORM®

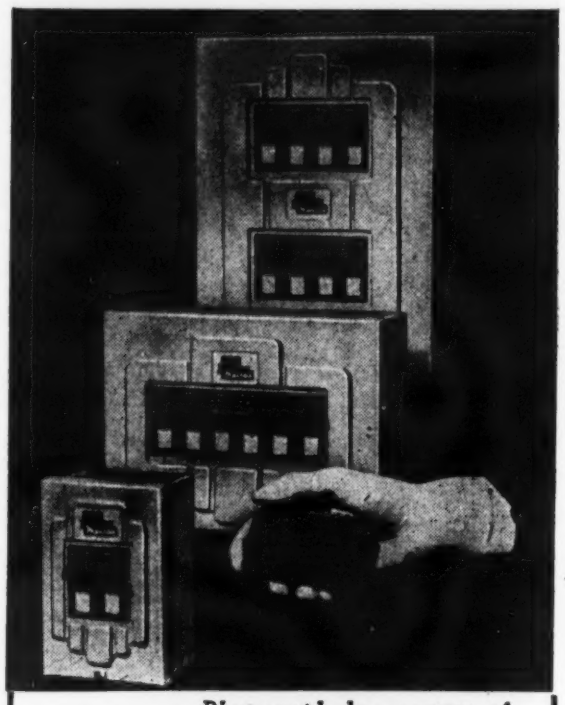
INTRODUCTION

"Lithoform" forms a dense, zinc phosphate coating on zinc, cadmium, and galvanized surfaces—including Galvanneal, cadmium plated steel, zinc plated steel, zinc base alloys, and zinc base die castings. The "Lithoform" coating, which is non-metallic and inactive, retards reaction between alkaline metal oxide and the paint film. Peeling and loss of adhesion are thus greatly retarded on painted Lithorized zinc and cadmium.

ADVANTAGES OF "LITHOFORM"

"Lithoform" forms a durable bond for paint. It is economical. It eliminates frequent repainting. It protects both the paint finish and the metal underneath. "Lithoform" meets these Government Finish Specifications:

QQ-P-416
RR-C-82
MIL-E-917A (Ships)
JAN-F-495
AN-F-20
U.S.N. Appendix 6



Photograph by courtesy of Murray Manufacturing Corp.

Murray Circuit Protectors are fully magnetic and provide maximum protection for both domestic and industrial wiring. Housings are of galvanized iron which is Spray Lithorized for long paint life.

THE LITHORIZING PROCESS

"Lithoform" can be applied by brushing or spraying the work with simple hand equipment, by dipping it in tanks, or by spraying it in industrial power washers.

Brush. Galvanized bay windows, cornices, rain gutters, hardware, building siding, truck panels, and farm equipment are typical of the many surfaces that are treated effectively with Brush "Lithoform".

Dip. This grade is used for coating cleaned surfaces of such typical products as cabinets, refrigeration condensers, etc., immersed in heated solutions in tanks.

Spray. The spray process is the most logical one with which to coat sheets, coiled strip or duplicate products best processed on a conveyor.

CHEMICALS ACP PROCESSES

WRITE FOR FURTHER INFORMATION ON "LITHOFORM" AND ON YOUR OWN METAL PROTECTION PROBLEMS.

CHEMICALS ACP PROCESSES

Elder will remain at his present address, 2339 11th Street, North, Arlington, Virginia. After this month, and for an indefinite period, he will live at 128 Broadport Avenue, Long Branch, New Jersey.

General Elder's military career began August 5, 1917, when he enlisted in the Kentucky National Guard. He was commissioned in the Reserve in 1918, and in the Regular Army in 1920. During World War II he held important supply assignments with the Signal Corps, including command of the Philadelphia Signal Corps Procurement District. Shortly after the war he became Chief of the Procurement and Distribution Branch, Signal Division, European Command.

In August, 1949 General Elder became Chief of the Procurement and Distribution Division, Office of the Chief Signal Officer; a position he held until October, 1951 when he left because of illness.

On October 16, 1951 Brigadier General Victor A. Conrad, former Chief of the Army Communications Service Division, Office of the Chief Signal Officer, became Acting Chief of the Procurement and Distribution Division. He became Chief on March 8 of this year.

Among those attending the reception for General Elder were:

Major General S. B. Akin (Ret) former Chief Signal Officer; Major General J. Matejka, Military Director for Production and Requirements, Munitions Board; Major General William O. Reeder, Deputy Assistant Chief of Staff. G-4; Brigadier General J. D. O'Connell, Deputy Chief Signal Officer: Brigadier General Victor A. Conrad, Assistant Chief Signal Officer for Procurement and Distribution; and Brigadier General W. Preston Corderman, Commanding General, Signal Corps Supply Agency, Philadelphia.

During retirement ceremonies for Brig. General E. V. Elder, Brig. General James D. O'Connell presented the General with a plaque. Mrs. Elder looks on.

OCSigO Assignments

Colonel Everett L. Butler has reported for active duty training with the Comptroller.

Colonel Horace L. Reynolds and *Captains Jay N. Stonebaker* and *Joseph F. Byrne* have reported for active duty training. They are attached to the Signal Plans and Operations Division, Army Communications Service Division, and Personnel and Training Division, respectively.

Lt. Col. Harry W. Berry has been designated Army Coordinator of the Coordinating Panel, JCEC.

Lt. Col. Arthur L. Baker and *Major James G. Hearick* have reported for duty in the Career Management Branch.

Lt. Col. John F. Kuster has reported for duty in the office of the Inspector General.

Lt. Col. Milton D. Weeks has reported for duty in the Personnel and Training Division.

The following officers were graduated from the Communication Officers Short Course at the U. S. Naval Postgraduate School, Monterey, California, on dates indicated:

April 11, 1952
Group 21C

Ensign W. W. Cornelius, USN
Lieutenant F. J. Desmond, USNR
Ensign L. A. Dubois, USNR
Lieutenant J. P. Evans, USNR
Lieutenant (jg) C. M. Niman, USNR
Lieutenant R. H. Pedersen, USNR
Ensign A. R. Roan, Jr., USNR
Ensign O. B. Stieren, Jr., USN
Lieutenant (jg) P. B. Vincent, USNR
Lieutenant J. A. Webster, Jr., USNR
Ensign B. A. Everett, USN
Lieutenant C. S. Goodgame, USNR
Ensign S. C. Lang, USN
Lieutenant (jg) A. Levitt, USNR
Ensign Wm. H. Lloyd, USNR
Lieutenant Commander L. J. Matte, USNR
Lieutenant John Michael, Jr., USNR
Lieutenant L. M. Roberts, USNR
Lieutenant G. L. Sarris, USNR
Ensign C. J. Stockman, Jr., USN
Lieutenant E. W. Tufts, USNR
Lieutenant (jg) C. M. Walker, USN
Ensign B. Weinbaum, USN
Lieutenant E. B. Woodbridge, Jr., USNR

May 9, 1952
Group 22A

Ensign O. H. Bell, USNR
Ensign W. J. Boyd, USNR
Lieutenant D. W. Casey, USNR
Lieutenant D. J. Crider, Jr., USNR
Ensign J. S. Elfelt, USN
Lieutenant E. M. Friedlander, USNR
Lieutenant (jg) W. H. Gathje, USN
Lieutenant (jg) Eugene C. Gravelle, USNR
Lieutenant (jg) D. J. Hendrick, Jr., USNR
Ensign Harold Hiken, USNR
Lieutenant F. P. Hoagland, USNR
Lieutenant (jg) R. B. Ledridge, USN
Lieutenant C. R. McNeely, USNR
Ensign F. A. McQuade, USNR
Ensign K. S. Moulton, USNR

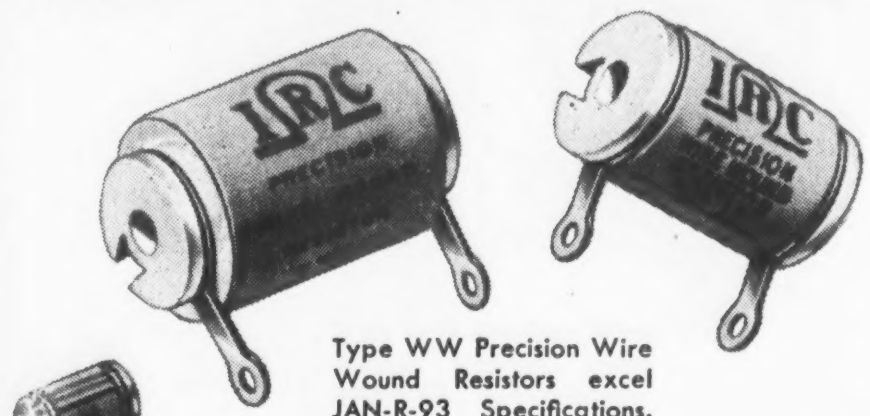
Awards for Amateur Radio Operators

The Army, Navy and Air Force offered a double-header program for licensed amateur radio operators on Armed Forces Day, Saturday, May 17, 1952.

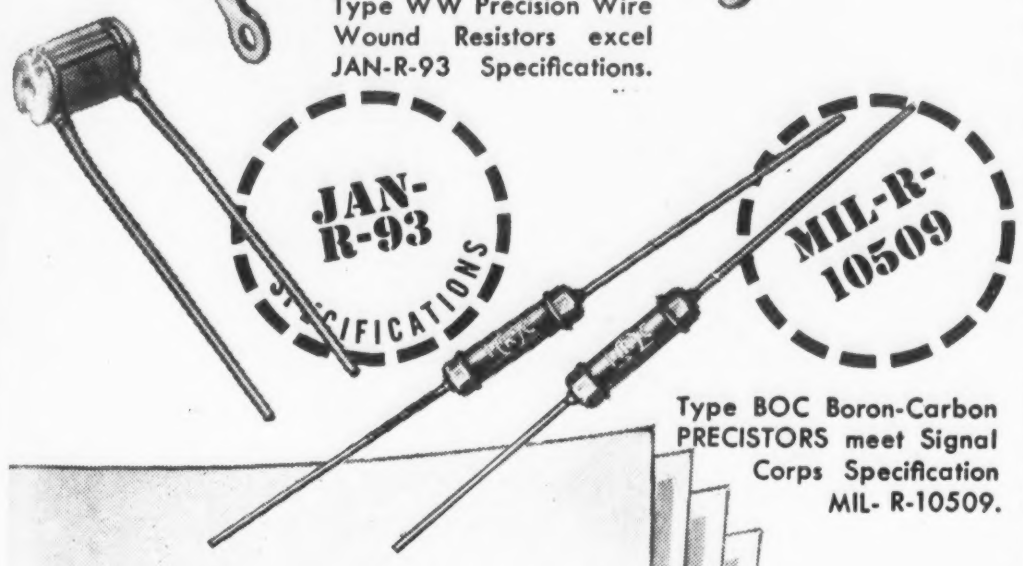
The three Services co-sponsored a receiving competition and a military-to-amateur test, patterned directly after the successful 1951 Armed Forces Day exercise.

The receiving competition was open to any short wave listener who could "read" International Morse Code at 25 words per minute. Any listener who submitted a perfect copy received a Certificate of Merit, attest-

TESTS PROVE THESE NEW RESISTORS HAVE NO EQUAL FOR CRITICAL ELECTRONIC AND AVIONIC CIRCUITS

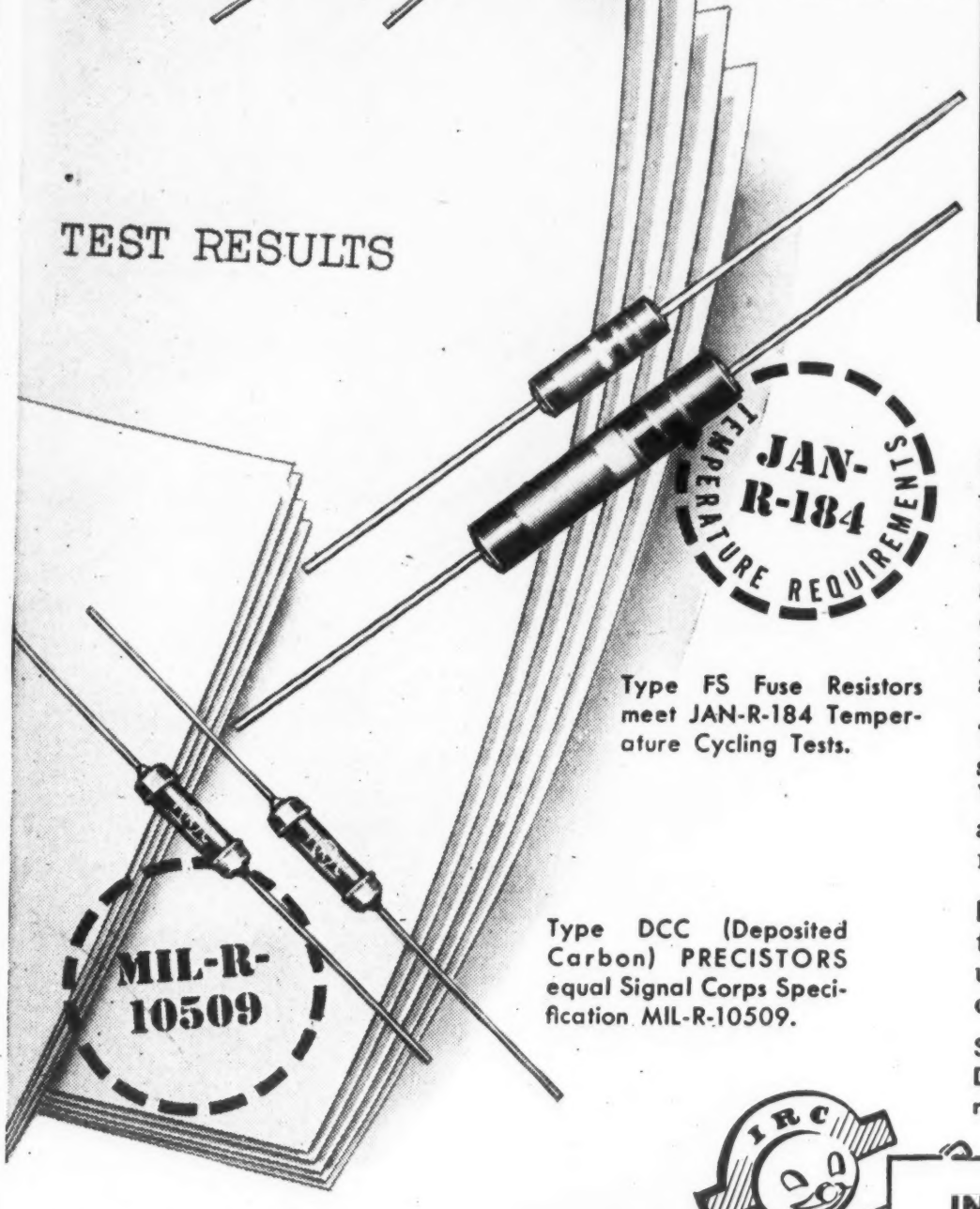


Type WW Precision Wire Wound Resistors excel JAN-R-93 Specifications.



Type BOC Boron-Carbon PRECISTORS meet Signal Corps Specification MIL- R-10509.

TEST RESULTS



Type FS Fuse Resistors meet JAN-R-184 Temperature Cycling Tests.

Type DCC (Deposited Carbon) PRECISTORS equal Signal Corps Specification MIL-R-10509.

Where an Armed Forces or Industrial specification sets up hard-to-meet requirements—*beat* them with these newly developed IRC resistors! Unbiased comparative tests *prove* they have no equal in reliability and stability.

All-new Type WW Precision Wire Wounds far surpass JAN-R-93 Characteristic B Specifications! New winding forms hold more wire for higher resistance value. New winding technique ends possibility of shorted turns or winding strains. New terminations are rugged and strain-free. New type insulation beats humidity—assures long, dependable high temperature life.

	Original Resist.	1st Cycle % Chge	2nd Cycle % Chge	3rd Cycle % Chge	4th Cycle % Chge	Resist. at End of 100 hrs. load	Total % Chge	% Chge from Last Temp. Cycle to End of 100 hrs. load %	Resistance Chge at End of 100 Hrs. Load only % (no cycling)	
1	100,010	+.04	+.04	+.05	+.05	100,050	+.04	−.01	100,040	−.02
2	100,000	+.03	+.04	+.03	+.05	100,060	+.06	+.01	100,000	0
3	100,000	+.01	+.02	+.02	+.05	100,000	0	+.05	100,050	−.02
4	100,000	+.02	0	+.02	+.02	100,000	0	−.02	100,040	−.01
5	100,010	+.03	+.04	+.04	+.05	100,000	0	−.05	100,030	−.03
6	100,000	0	+.03	+.04	+.04	100,100	+.1	+.06	99,980	0
7	100,000	+.04	+.05	+.04	+.04	100,070	+.07	+.03	100,000	0
8	100,000	+.03	+.05	+.05	+.05	100,050	+.05	0	100,000	0
9	100,000	+.04	+.03	+.05	+.04	100,010	+.01	−.03	100,050	0
10	100,000	+.02	+.02	+.02	+.04	100,010	+.01	−.03	100,000	0
11	100,000	0	+.01	+.01	+.03	100,000	0	−.03		

Severe cycling and 100-hour load tests resulted in virtually zero changes in resistance. Other rigid tests prove Type WW's high mechanical strength, freedom from shorting, resistance to high humidity.

New Type BOC Boron-Carbon PRECISTORS offer tremendous advantages in military electronic equipment—radar, gunfire control, telemetering, communications, computing and service instruments. Type BOC's combine high accuracy and long-time stability, reduce temperature coefficient of conventional deposited carbon resistors, replace high value wire wound precisions at substantial savings in space and cost.

Type DCC (Deposited Carbon) PRECISTORS are the latest small-size, high-stability units for high frequency circuits. Voltage coefficient and capacitive and inductive reactance are low. Type DCC's are the *economical* answer to the needs of modern electrical and electronic circuits.

New Type FS Fuse Resistors are dual-purpose units, functioning as resistors under normal conditions and as fuses under abnormal conditions. They can be wired into circuits as easily as molded wire wound resistors.

Send for full technical data on these resistors. Remember—Your IRC Distributor can give you prompt delivery of experimental or pilot-run quantities—right from his local stocks.

Wherever the Circuit Says -WW-

Power Resistors • Voltmeter Multipliers
Insulated Composition Resistors
Low Wattage Wire Wounds
Controls • Voltage Dividers
Deposited Carbon PRECISTORS
HF and High Voltage Resistors
Precisions • Insulated Chokes
Boron-Carbon PRECISTORS.

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Please send me full information on:—

Type WW Precision Wire Wounds ☐
Type DCC PRECISTORS ☐
Type BOC Boron-Carbon PRECISTORS ☐
Type FS Fuse Resistors ☐

*Name*_____

*Title*_____

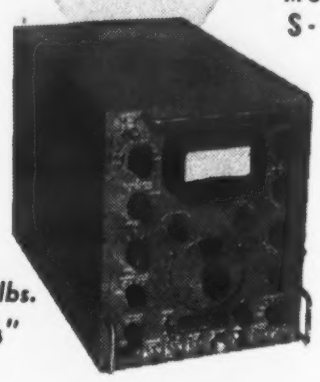
*Company*_____ *Address*_____

*City*_____ *State*_____

THE SAR PULSESCOPE®

BY WATERMAN

MODEL S-4-A



Weight 31.5 lbs.
9⅛" x 11¼" x 17¼"

Another example of WATERMAN pioneering, a compact, portable instrument for precision pulse measurements adaptable for all electronic work, including radar and TV. S-4-A SAR PULSESCOPE will portray all attributes of the pulse; such as shape, amplitude, duration and time displacement. In S mode of operation, the unit functions as a wide band oscilloscope, with optional video delay, in either repetitive or triggered sweep conditions. In A mode of operation the unit functions as a precision time measuring device, with internal crystal controlled markers available for self calibration. In R mode of operation a desired small segment of A Sweep is expanded to fill the face of the tube for detailed observation.

Video Amplifier band pass up to 11 mc . . . optional Video delay 0.55 μs . . . Pulse rise and fall time better than 0.07 μs . . . Video sensitivity of 0.5 p to p/inch . . . S Sweep 80 cycles to 400 KC either triggered or repetitive . . . A Sweep 1.2 μs to 12,000 μs, R Delay 3 μs to 10,000 μs . . . Directly calibrated on a precision dial . . . R Pedestal (or sweep) 2.4 μs to 24 μs . . . A & R Sweep Triggers available externally . . . Internal crystal markers of 10 μs ± 50 μs . . . Built in precision amplitude calibration . . . Operates on 50 to 1000 cycles at 115V AC.

WATERMAN PRODUCTS CO., INC.
PHILADELPHIA 25, PA.
CABLE ADDRESS: POKETSCOPE

WATERMAN PRODUCTS INCLUDE:

S-5-A LAB	PULSESCOPE
S-10-B GENERAL	POCKETSCOPE
S-11-A INDUSTRIAL	POCKETSCOPE
S-14-A HIGH GAIN	POCKETSCOPE
S-14-B WIDE BAND	POCKETSCOPE
S-15-A TWIN TUBE	POCKETSCOPE

Also RAYONIC Cathode Ray Tubes
RAKSCOPES and other equipment

WATERMAN PRODUCTS

Colonel Loren Gaither

Colonel Ralph D. McKinney

ing code copying proficiency, over the signature of Secretary of Defense Robert A. Lovett.

The military-to-amateur test was for holders of valid FCC amateur radio operator licenses. Headquarters stations of the Army, Navy and Air Force established radio contact with amateur operators and acknowledged these contacts with official "QSL" cards. Each Service station would QSL separately so amateurs would have an opportunity to get three different QSL cards.

Combat Veterans Receive Assignments

A pair of combat veterans recently returned from overseas have been named directors of Signal Corps Engineering Laboratory divisions.

Named new head of Evans Signal Laboratory in West Belmar is Colonel Loren E. Gaither, past chief of the EUCOM communications branch. New director of Squier Signal Laboratory is Colonel Ralph D. McKinney, signal officer for the Alaskan Army Command for the past 2½ years.

Gaither, an AFCA member and one of SIGNAL'S favorite authors, will supervise work in applied and nuclear physics, radar, meteorology, thermionics, and counter-measures, also served as technical director of the Armed Forces Network from 1948-52. A native of Siloam Springs, Ark., he received a B.S. in E.E. degree from the University of Arkansas in 1929. He also attended the University of Colorado and Carnegie Tech, and has done special study with the General Electric Company.

Known widely for his music composition hobby, his selections were presented in "all Gaither" concerts by the Weisbaden Symphony and Heidelberg Symphonic orchestras.

ENGINEERING OPPORTUNITIES
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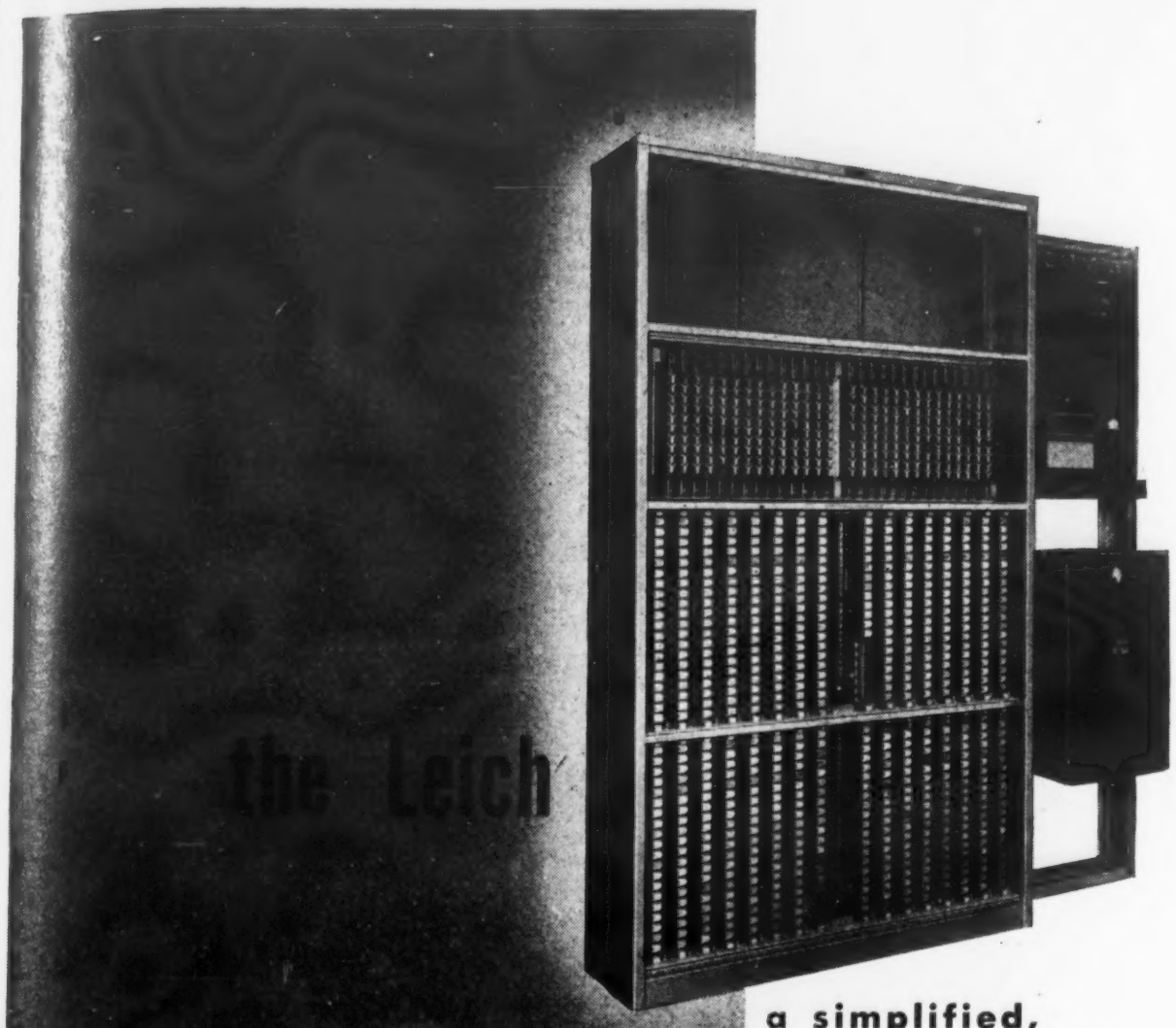
Westinghouse
WANTED
Design Engineers and Technical Writers

For work on airborne radar, shipborne radar, radio communications equipment, microwave relay, or microwave communications.

Good pay, excellent working conditions: advancement on individual merit: location—Baltimore.

Send resume of experience and education to:

Manager, Industrial Relations
Westinghouse Electric Corporation
2519 Wilkens Avenue
Baltimore 3, Maryland



the Leich dial system

a simplified, more dependable and flexible relay type dial switchboard

When we first introduced the Leich Dial System, the most enthusiastic comments came from people with long experience in the operation of dial apparatus.

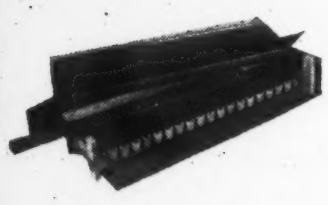
They could plainly see the advantages the Leich Dial System offered because of their first-hand knowledge of the then available switching equipment.

The simplicity, the unique construction that eliminated thousands of soldering joints, that made the Leich Dial System easy to understand and operate, appealed to them. When they discovered that lines and links could be added quickly and inexpensively by their own men, with no factory installers necessary, they agreed we had the answer to their prayers for a more sensible dial switchboard.

The panel below tells how simple and easy it is to add to the Leich Dial System. A 20 page illustrated catalog gives more complete information. Write for it.

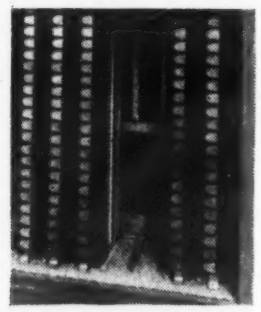
How you can add ten lines to the Leich Dial System in ten minutes.

1



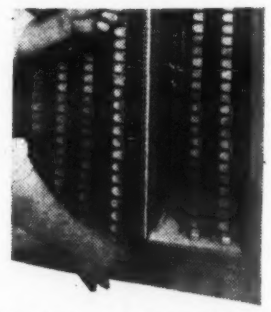
Single, jack-in relay bars contain the line and cut-off relays for each group of ten lines. These are carried in stock — wired, tested, ready to install.

2

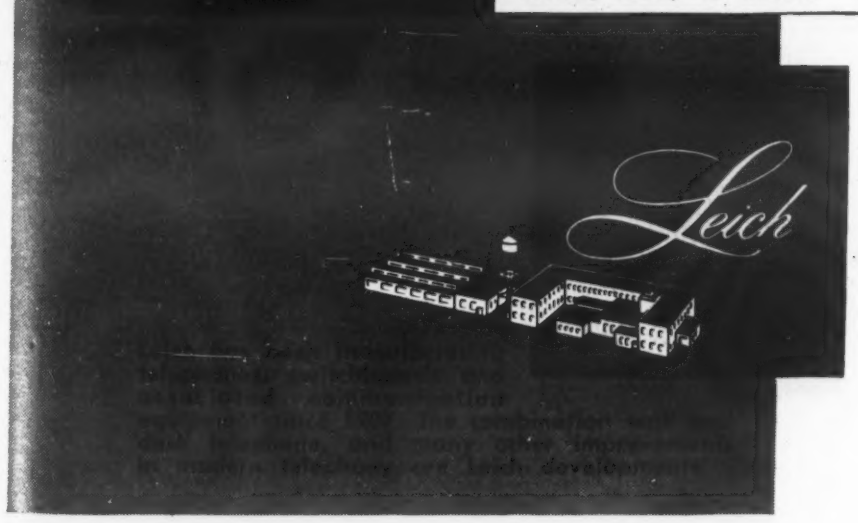


This shows where the line relay bars are jacked-in. Every switch-board is fully wired and contains the jacks for plugging-in these 10-line relay bars up to full capacity.

3



All that's necessary is to jack-in the relay bar units as shown here. Each relay bar jacked-in adds 10 lines to the switch-board.



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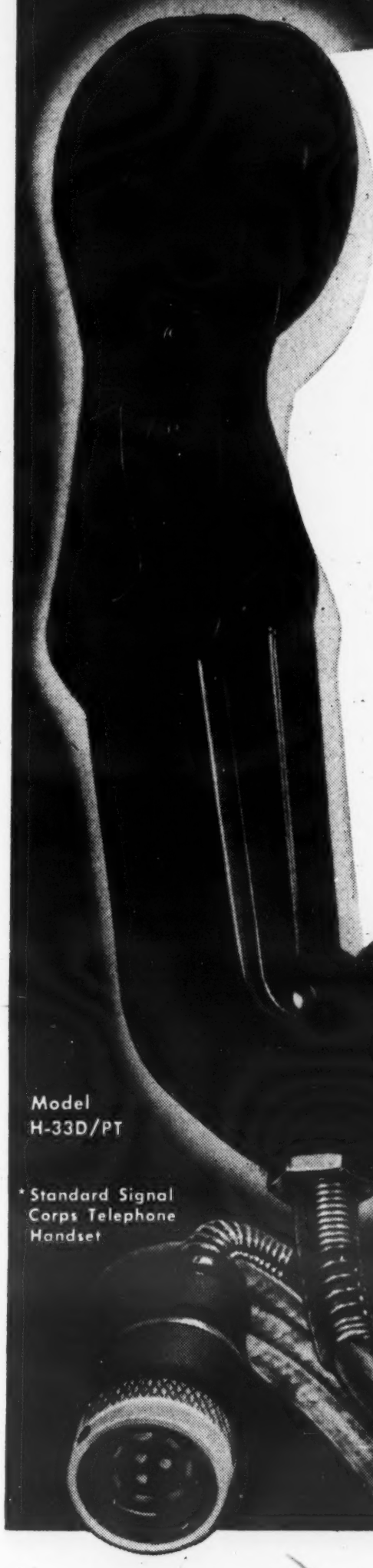
An Important Statement about the SHURE Military Telephone Handset*



TO FIRMS ENGAGED IN DEFENSE PRODUCTION:

We are currently manufacturing Military Telephone Handsets for companies with contracts for communications equipment. These Handsets are an improved development of the original standard Signal Corps H33 Handset.

Today Shure is far-and-away the top producer of H33's—and has achieved an outstanding record for delivering the right quantity of the right quality at the right time.

Our facilities are available for a limited additional production of these Handsets. Companies needing H33 Military Telephone Handsets have our assurance of "Delivery on Time; Quality as Specified."

Very truly yours,

SHURE BROTHERS, INC.

Model H-33D/PT

*Standard Signal Corps Telephone Handset

Complete Handsets or separate receiver or transmitter units are available on rated orders

FOR COMPLETE INFORMATION, WRITE, WIRE or CALL

SHURE BROTHERS, INC.

Department of War Contract Sales
225 West Huron Street
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Cable Address: SHUREMICRO

McKinney, a 1934 West Point graduate from Marlow, Okla., served as signal officer for the First Cavalry Division in the Southwest Pacific from 1943-45. After the war he served with the Army Field Forces Board at Fort Bragg, N. C. from 1946-47, and as member of the Research and Development Division, Army General Staff.

As director of Squier Laboratory he is in charge of research and development in photography, components and materials, frequency control, power sources, and chemical-physics fields.

Gilbertson Signal Officer in Iceland

Two former telephone company engineers—both lieutenant colonels at The Southeastern Signal School here—barely got acquainted when one of them took over the other's job.

Lt. Col. Oscar F. Gilbertson, director of the wire division, TSESS, recently changed jobs to become chief signal officer of the Iceland Defense Command.

The 48-year-old Col. Gilbertson, a onetime Western Electric engineer in Chicago, was relieved of his Camp Gordon command by Lt. Col. Lawrence N. Van Nort, a methods engineer for Bell Telephone in New York.

The two colonels knew each other three weeks, with Van Nort acting as Gilbertson's assistant.

Then 53-year-old Col. Van Nort, who had 30 years service with the telephone company when he was recalled from the reserves Jan. 7, took over the reins of the wire division. Col. Gilbertson, of 415 N. Catherine St., La Grange Park, Ill., was formerly in charge of all engineering for the upstate New York and New England telephone exchanges.

A telephone employee for 23 years, Gilbertson served five years in World War II, rising from lieutenant to lieutenant colonel. He spent four years at the Presidio of San Francisco in charge of fixed army communications in eight western states.

Col. Charles A. Thorpe Awarded Commendation Ribbon

The Air Force communications and electronic system used in support of "Operation Greenhouse," the Eniwetok atomic test, have earned a commendation ribbon for Col. Charles A. Thorpe former Washingtonian who

has been stationed here since last August.

He was cited in particular for responsibility in developing electronic means to meet the highly exacting requirements related to atomic air operations.

The colonel is well known in communications circles through having been chief of the Electronics Requirements Division of the U. S. Air Force in Washington.

In the past he was on the radio and radar committees of the Research and Development Board and of the Munitions Board. He also was on the Joint British-American Standardization Committee which met in London, Montreal and Washington.

Unit Cited for Maneuver Work

A letter of appreciation for maneuver work during Exercise "Snowfall" has been received by the 24th Signal Service Battalion stationed at Fort Devens. The message of congratulation was written by Major General C. G. Helmick, Commanding general of the Headquarters Umpire Group.

Lieutenant Colonel Clayton L. Chaput, commanding officer of the signal battalion, forwarded the letter with his own commendation to the officers and men of the battalion.

Text of General Helmick's letter:

"I wish to express my appreciation for the splendid manner in which you and members of your command performed the mission of operation and maintainence of the communications system for Headquarters, Umpire Group, during Exercise SNOWFALL at Camp Drum, New York.

I am fully aware of the important and vital part that efficient communications play in an exercise of this nature and the necessity for a dependable communications system for control of the operations by the umpires. You and your command fully met the difficult task that was assigned to you and in large measure assisted in the success of the Maneuver.

"I want to congratulate you on a job well done."

The message was signed "C. G. Helmick, Major General. United States Army, Commanding."

With the completion of Exercise "Snowfall", the 24th Signal Service Battalion added another successful maneuver to its list which now includes "Portrex", "Swarmer" and "Southern Pine."

WHEN *Experience* COUNTS

IT'S *Bendix* EVERY TIME

★ PIONEER IN THE DEVELOPMENT OF GROUND RADAR

★ PIONEER IN THE DEVELOPMENT OF AIRCRAFT COMMUNICATION EQUIPMENT

★ PIONEER IN THE DEVELOPMENT OF AIRCRAFT NAVIGATION EQUIPMENT

★ PIONEER IN THE DEVELOPMENT OF RAILROAD RADIO SYSTEMS

Bendix Radio is currently engaged in the manufacture of Ground Controlled Approach Aircraft Landing Systems, Airborne Communication Equipment, Airborne Navigation Systems, Mobile Communication Equipment, Railroad Communication Systems, Automobile Radios and precision electronic equipment expressly designed for the Military Services.

Bendix Radio

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Military Amateurs

Amateur Radio at China Lake

An inspection of the radio amateur call book discloses that there are 24 licensed amateur radio operators at the Naval Ordnance Test Station, Inyokern, China Lake, California. China Lake is about 80 miles, as the crow flies, from Bakersfield, the nearest large city. Unfortunately, there are very few crows stationed at China Lake. It is a longer trip by road, and the local recreational facilities are limited. It is not surprising, therefore, that amateur radio receives so much attention.

Some of the "hams" took their hobby to China Lake with them; others acquired it there. Among the former is Lieutenant Elwood C. Veregge, USMC. He has been an amateur operator for 15 years. With his 500-watt transmitter, he has made contacts with 165 countries, including the Anglo-Egyptian Sudan, Oman, Italian Somaliland, New Guinea, and Pitcairn Island. His call is W6PBI.

Frank J. Kirby, an electronics technician, has been a "ham" for 25 years. His interest started when he took a Boy Scout merit badge examination in radio. As W6WI, he operates a 400-watt transmitter from his home and a 450-watt transmitter from his car. Kirby is one of the few West Coast amateurs who uses single sideband emission for "phone" work.

Kirby's son, Laird, is one of those who has acquired his hobby recently. He now has a Novice class license with the call WN6PLH.

Fred S. Howell, Head of the radar section, Metric Electronics Branch, Test Department, operates amateur station W6MTY. Howell received his first radio license in 1936. He is now teaching a class in International Morse Code for about 18 members of the Marine Guided Missile Unit, who want to get amateur radio licenses.

"Ham" radio is probably responsible for Howell's coming to China Lake. His original contact was by radio through Rodney W. Johnson (W6MUB), Head of the Metric Electronics Branch, Test Department.

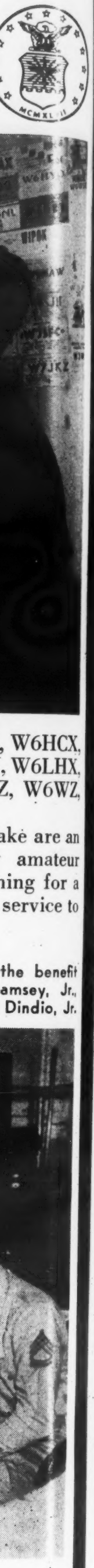
The usefulness of "hams" was provided locally in November 1951, when the Kern River overflowed its banks and drove 1000 people from their homes at Kernville. George R. Sutherlen (W6DUF), took a portable radio station into the flood area to help maintain communications with the outside world. Dick Pearson and Bob Collins (W6WBY) manned the other end of the circuit for Sutherlen.

Chief Radioman Donald Johnson, USNR, of South San Francisco, California, at the operating position of his amateur station W6QIE.

In addition to the amateur stations mentioned above, the following are located at China Lake: W6AUO, W6AXR, W6COU, W6DEM, W6DWZ, W6FGA, W6FHF, W6GAN, W6HCX, W6HNJ, W6KJH, W6KVW, W6LHX, W6MHW, W6TLS, W6UGZ, W6WZ, and W6ZDO.

The activities at China Lake are an excellent example of how amateur radio can be a hobby, training for a career in electronics, and a service to the community.

In operating position at amateur radio station KH6AJF maintained by and for the benefit of Fleet Marine Force personnel at Pearl Harbor, T. H. L-R: Col. F. A. Ramsey, Jr., (KH6AGV), trustee of the station; Cpl. D. J. Gee, (W7NCQ) and Tech. Sgt. A. Dindio, Jr.



, W6HCX,
, W6LHX,
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Write for Electronic Components Catalog RC-8

AMATEUR RADIO

Naval Amphibious Base Amateur Radio Club Little Creek, Va.

W4OYL is the call sign for the Naval Amphibious Base Amateur Radio Club, Little Creek, Va. This club has a membership of 15, of whom 10 are licensed amateur operators. The "home" calls for the latter are: W4TTU, W3ETD, W6IDL, WØIUL, W3OGE, W4RRA, W4OGX, WILWJ, WIQVK, and W3RMB.

The club station transmitter is a BC-610E, which operates in the 80-, 40-, and 20meter amateur bands. The receiver is an HRO 50T1.

Activities of the club include traffic handling, DX, code instruction, and construction work. A l-kw. amplifier for the club station is being built.

This ham radio unit rushed from Conway, Ark., to the scene of the state's worst tornado in history was put into operation in Bald Knob by its owner. Until downed telephone lines could be repaired, the set furnished the only means of sending communications out of devastated Bald Knob and Judsonia.

Navy Amateur Radio News

P. G. Lockard, radioman seaman, U. S. Navy, has been elected president of the Coral Isle Amateur Radio Club. This club is located at the Naval Communication Station, Guam, Marianas Islands, and is assigned the call KG6AAY.

W4MSN, *Captain H. H. McCarley,* U. S. Navy, District Communication Officer of the Sixth Naval District, has been elected president of the Armed Forces Communications Association's South Carolina chapter.

Commander Ivan Loucks, USNR, was recently awarded a length-of-service pin by the Federal Communications Commission, where he is employed, for completion of 20 years of government service. Commander Loucks formerly served as Commanding Officer of Volunteer Electronics Company W-1 of Washington, D. C., for three years. He is now Material Officer of that company.

Commander Edwin W. Lovejoy, USNR, was awarded his length-of-service pin by the Federal Communications Commission for completion of 30 years government service. Commander Lovejoy was formerly a member of Volunteer Electronics Company W-5 of Washington, D. C.

Lieutenant Commander George K. Rollins, USNR, another employee of the Federal Communications Commission, received his length-of-service pin for completion of 20 years of government service.

Approximately 50 of the Headquarters USAF, Mars members are shown below on the steps of the Pentagon. Further information on this group will be carried in SIGNAL July-August issue.

USAF

Bolivian Revolt

Through the Air Force MARS station AH4EH located at Lima, Peru came the first news from the American Embassy in Bolivia that another revolution had ended, the opposition was victorious and all Americans in La Paz were safe.

Nebraska Food Area

Headquarters 10th Air Force placed an emergency operation team in the Nebraska flood area in accordance with DEP-52 10th Air Force. Communications within the disaster area were being handled by SAC and 10th Air Force MARS circuits with terminations at both Headquarters USAF and Headquarters 10th Air Force. The American Red Cross units have tied to the MARS network and Mr. Rickter of the Washington Office were presently in the flood area and MARS was standing by to handle traffic for him.

Mars Operation and Participation In Sarcap

A number of MDW net stations and operators, among them AF4PWX and AF4KMG participated in the Simulated Air Rescue Civilian Air Patrol drill held in central Maryland area on Sunday, 20 April 1952 from 0800 to 1500 hours. The total number of operators participating is unknown at this writing. In the future, the MDW personnel expect to participate on an increased basis.

Mountain Home Air Force Base, Idaho

Mountain Home Air Force Base is the proud owner of one of the newest MARS Stations—given the call letters K7FBL. The Mountain Home Station, with a power of 750 watts, is

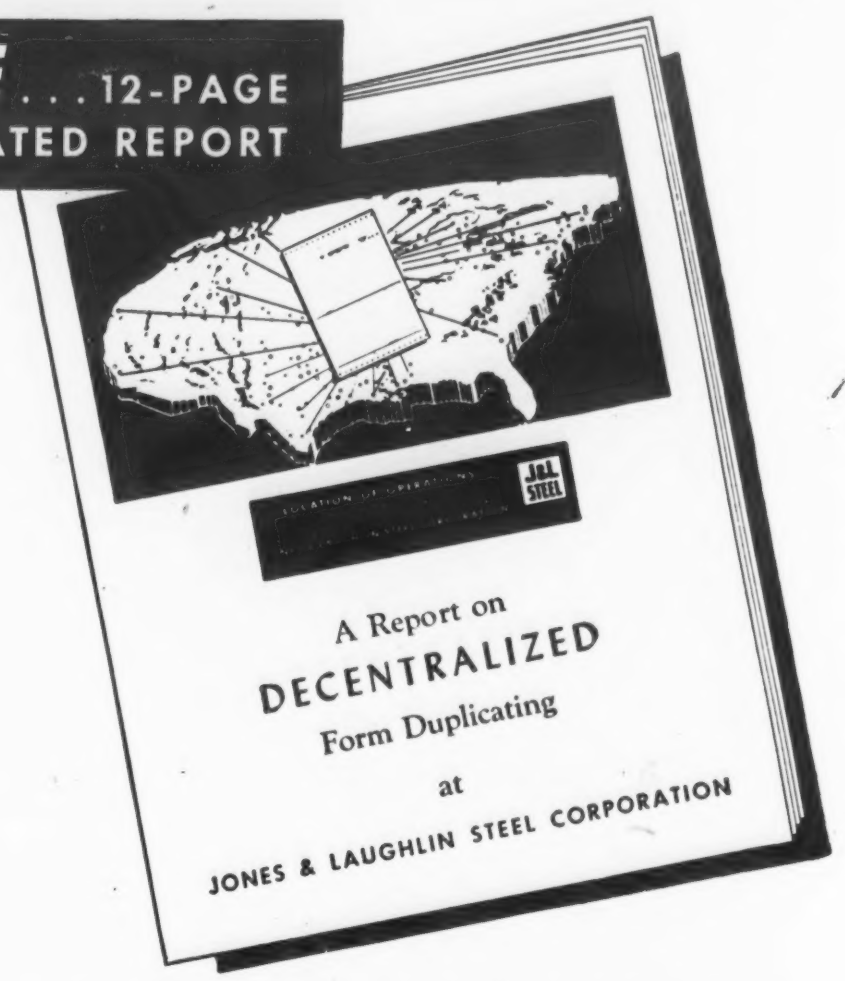
F. J. Kirby (see China Lake story, pg. 68) gives a resume of Southern California weather to a fellow "ham" in Seattle while his son monitors the transmission. Below: Kirby tests the 450 watt transmitter installed in his car.

capable of contacting short wave stations the world over.

The MARS Station Director at Mountain Home is Major Dominic A. Bartol, an ardent "ham" himself. Deputy Director is Captain C. A. Koppe, who, during World War II helped to establish a number of important communication stations for the Air Force in Turkey and other areas in the Middle East.

Captain Koppe travels one hundred twenty miles at his own expense to present the "MARS" story to the "Gem State Radio Club" which has approximately fifty (50) licensed amateur operators in attendance and meets the second Friday of each month at Boise, Idaho.

The Mountain Home MARS Station's construction was started in December of 1951. Federal Communication Commission's authorization for actual air operation was received 28 January 1952. Present plans will allow base personnel with an interest in amateur radio an opportunity for off duty hours training in the field that will eventually lead to their own "ham" licenses.



JONES & LAUGHLIN STEEL CORPORATION Estimates $250,000 Annual Savings Using XEROX-Multigraph Methods For Duplicating Hundreds of Office Forms

Faced with today's higher operating costs and increasing taxes, management welcomes new ways to cut costs.

A survey at Jones & Laughlin revealed that by adopting XeroX-Multigraph duplicating methods they would save approximately $250,000 annually through a new Decentralized Form Duplicating Program.

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PHOTOGRAPHY

Photo-Light Bar

A new Underwriter-approved Kodak Photo-Light Bar for home movie-making indoors has been announced by the Eastman Kodak Company. The bar, which has been performance, specification, and safety checked in all respects, is suitable for use with either 375-watt medium-beam Reflector Flood lamps or 500-watt Reflector Flood or Spot Lamps. It can be used with any movie or still camera having a standard tripod socket.

For ease in carrying and storage, the bar features two sloping uprights which are riveted to the main bar under spring pressure. These can be swiveled outward to superimpose the beams from the two lamps on the subject, or they can be swung inward for convenient storage.

Each lamp socket on the new Kodak photo-light bar has an independent push-through, on-off switch. A ten-foot cord terminating in a molded cap for connection to a wall receptacle extends from the right hand socket. The sockets are interconnecting.

It is expected that this Kodak Photo-Light Bar will provide a simple, convenient, but efficient light unit for use with amateur motion picture and still cameras for both black-and-white and color films.

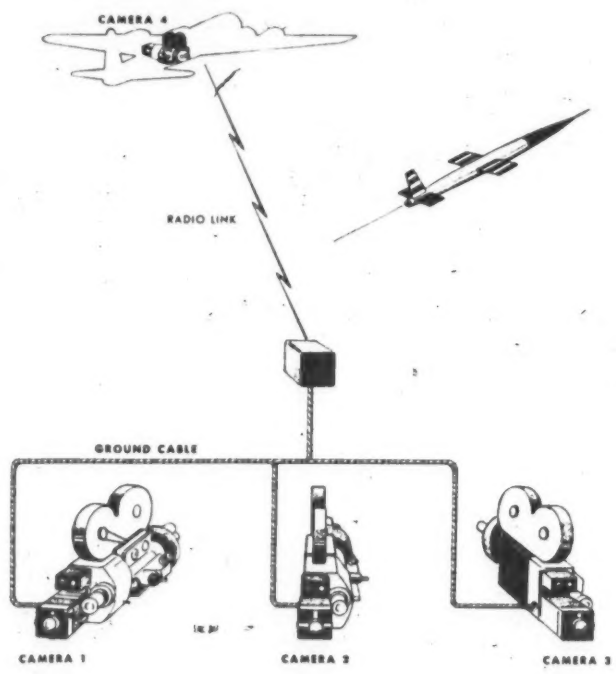
Miniature Roll-Film Tank

Two rolls of 35mm or 828 size films may be developed simultaneously in the new Kodacraft miniature roll-film tank. The new tank is a standard size roll-film developing tank, but it comes supplied with two 35mm width aprons rather than the regular roll film aprons generally supplied with the Kodacraft roll film tank. The new aprons are capable of accommodating either 36 exposure, 20 exposure, or 828 film.

Maurer Servo—Sync Camera Drive

The Maurer Servo-Sync Camera Drive provides synchronization for a series of motion picture cameras to very close tolerance, of the order of 1 degree of angular shutter position. Servo-Sync makes possible dependable, consistent, and accurate simultaneous operation.

The Servo-Sync system is not limited to one camera type, but is equally applicable for use with a large number of motion picture, scientific, and ribbon-frame cameras, and motion picture and process projectors. Among the scientific and engineering applications are: data recording, flight testing, missile tracking, ordnance evaluation, and three-dimensional studies where two geometrically oriented cameras are required for simultaneous recording. The system also has application in professional and television motion picture production where extremely close time synchronization of a number of cameras, projectors, or sound recording apparatus is required.



Maurer Servo-Sync Camera Drive, (typical installation).

Photographic Society Convention Non-Members Welcome

The answer to one of the most widely asked questions of the year in amateur and professional photographic circles alike, is "Yes."

Those who are not members of the Photographic Society of America and who would like to attend the national organization's first vacation-time convention, August 12th through 16th in New York City, will be just as welcome as regular members, it is announced by Paul Gibbs, general chairman.

There will be no special fee for registration of non-members. They, too, will be permitted to participate in all convention activities on payment of the regular five dollar convention registration fee for individuals. And for the convenience of those who can spend only one day at the convention a day rate of two dollars has been fixed for members and non-members alike.

Early announcement of courtesies to be accorded non-members was inspired, said Mr. Gibbs, by a great flood of inquiries coming from all parts of the country. In many cities, he said, parties of members and non-members are being planned for vacation time at the convention.

"All of this unusually early interest in this year's PSA convention appears to be due to the fact that scheduling the affair during one of the summer months instead of during the fall, as in the past, has made it possible for more people who are interested in photography to make a real holiday of the occasion.

"No doubt the fact that the convention is being held in New York City has something to do with it, too," he continued. "This area is a photographer's paradise with its subject matter furnishing limitless variety to suit the tastes of every kind of a photographer."

Quested Elgar, president of the Metropolitan Camera Club Council of the New York area, which is host organization, assures visitors that expert guides will be available before, during and after the convention to lead them to places they want to photograph and give them tips on how to make their pictures.

For the convenience of those who wish to complete their vacation plans early, advance registration blanks have been made available early. Members will receive theirs through the mails. Non-members may get blanks by writing to the Registration Committee, Pre-Convention Headquarters, c/o Metropolitan Camera Club Council, 310 Riverside Drive, New York, N. Y.

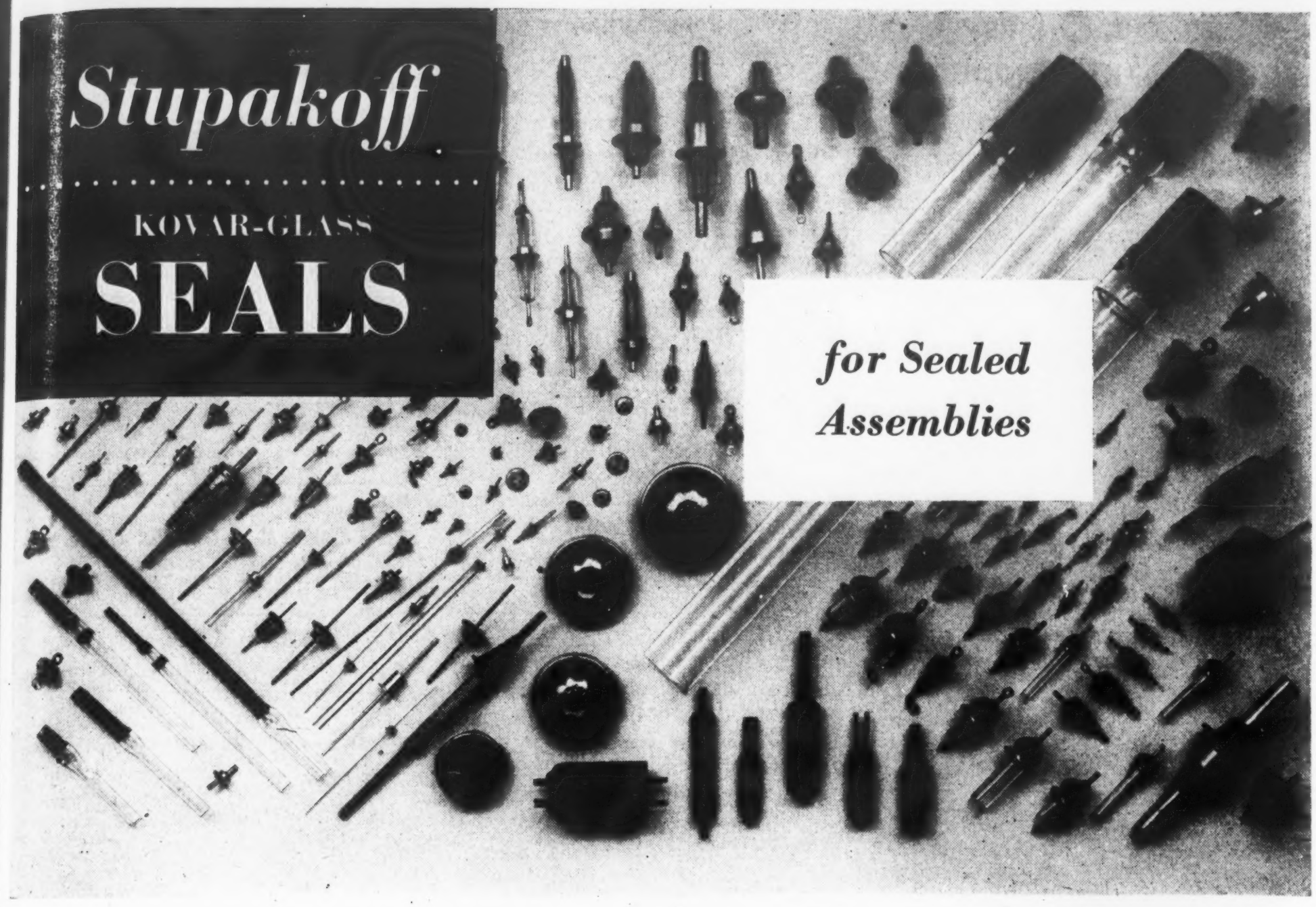
Kodachrome Professional Sheet Film Processing to be Discontinued July 31

The Eastman Kodak Company has announced that it will no longer process Kodachrome Professional Sheet Film after July 31, 1952.

Stupakoff

KOVAR-GLASS

SEALS



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SEND for Stupakoff Bulletin No. 851, containing photographs, drawings and specifications on many standard seals.

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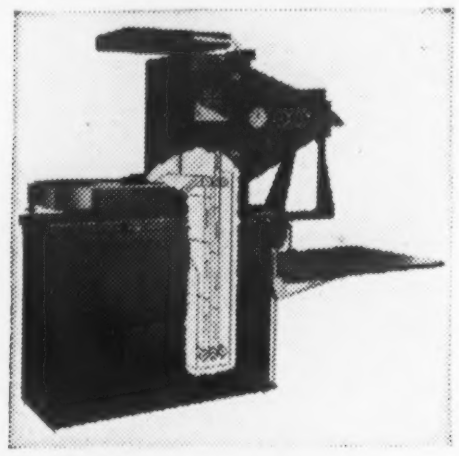

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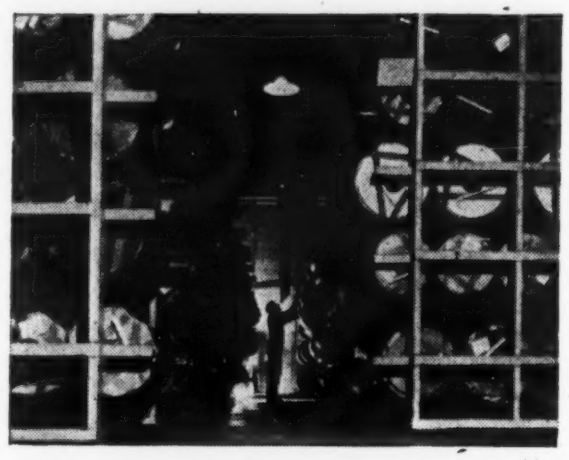

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The Rankaphone

(*Continued from page* 21)

right impertinent and most disrespectful to those so rudely being informed of the continuation in a circuit's prior commitments. In the waiting period military progress may stop or at best be slowed down like in a coffee break.

In face-to-face conversations, in the laboratory, classrooms, conference halls or in combat, lower rank automatically responds to psychological suppression when the higher brass asks for auricular channels—but not so the dial system!

I have now come to the point of divulging the cerebellum concept, which thanks to transistors, most certainly is destined to revolutionize military communications.

By way of background for the laymen, as science pitched frantically forward, urged on by the combined hope for peace and the constant threat of war, a device called the transistor has arrived, and no longer are we shackled by the complexities of the vacuum tube with its alleged unreliability, requirements for megawatts of power and concomitant unbalanced budgets.

In my invention, and thanks to the new solid-state device, I have built a gadget which goes a long way toward solving problems of military protocol through being a true respector of rank. I accomplish my objective through the use of simple computers no larger than walnuts, one with each telephone, with a somewhat larger one located in the telephone exchange room.**

Now the actual disclosure—

In my system each dial telephone has eight extra push buttons conveniently built in the front of the unit. These are marked as follows in accordance with the Unification Act:

(1) General/Admiral
(2) Colonel/Captain (USN)
(3) Lt. Colonel/Commander
(4) Major/Lt. Commander
(5) Captain/Lt. Sr. Grade
(6) 1st Lt./Lt. Jr. Grade
(7) 2nd Lt./Ensign
(8) UNO WHO

In using the system, the uniformed customer as usual lifts the receiver and listens for the dial tone, then pushes the button corresponding to his rank; and dials. The rank button serves to activate an oscillator in the exchange with a frequency corresponding to the indicated rank. After the party dialed picks up his phone, and before he can speak, he must also press the button cor-

(*Continued on page* 76, *col.* 1)

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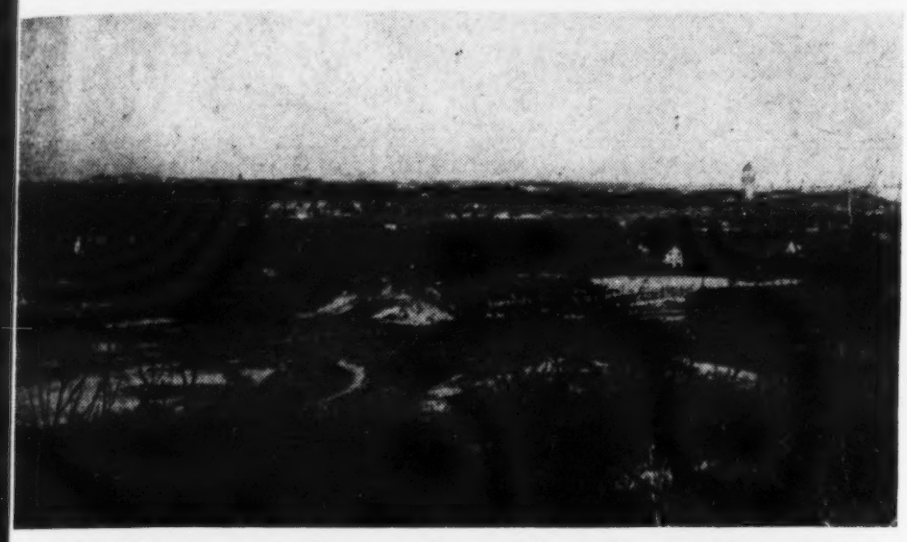
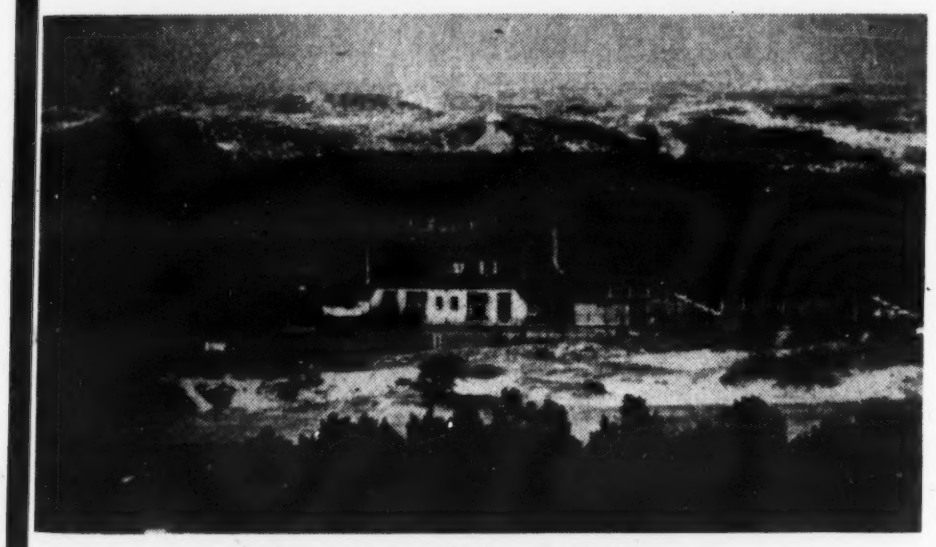
Actual tests show that light transmission and resolving power obtained with Wollensak *Mirror Optics* and suitable films surpass anything so far achieved with telephoto lenses of the usual design. And since Mirror Optical system absorbs less light . . . is more efficient . . . lenses are lighter, shorter, more compact than conventional lenses.

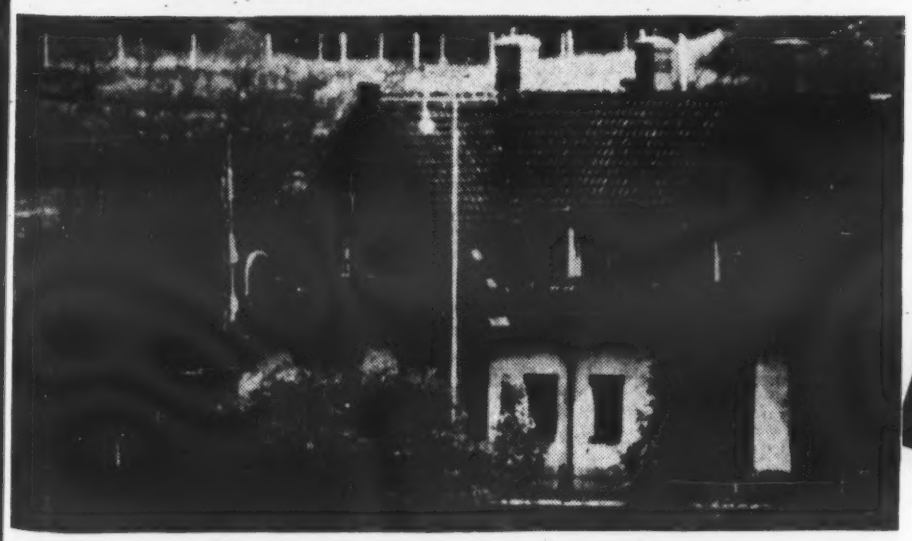
ACTUAL MIRROTEL PHOTOGRAPHS



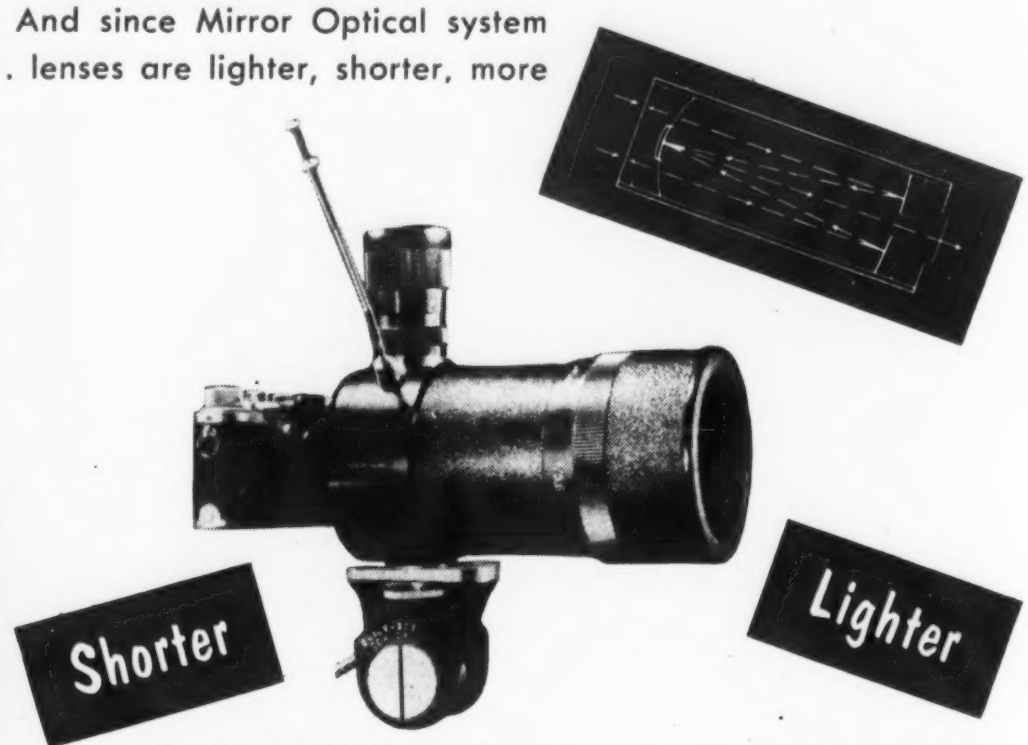
View of house from distance of one mile with normal focus lens



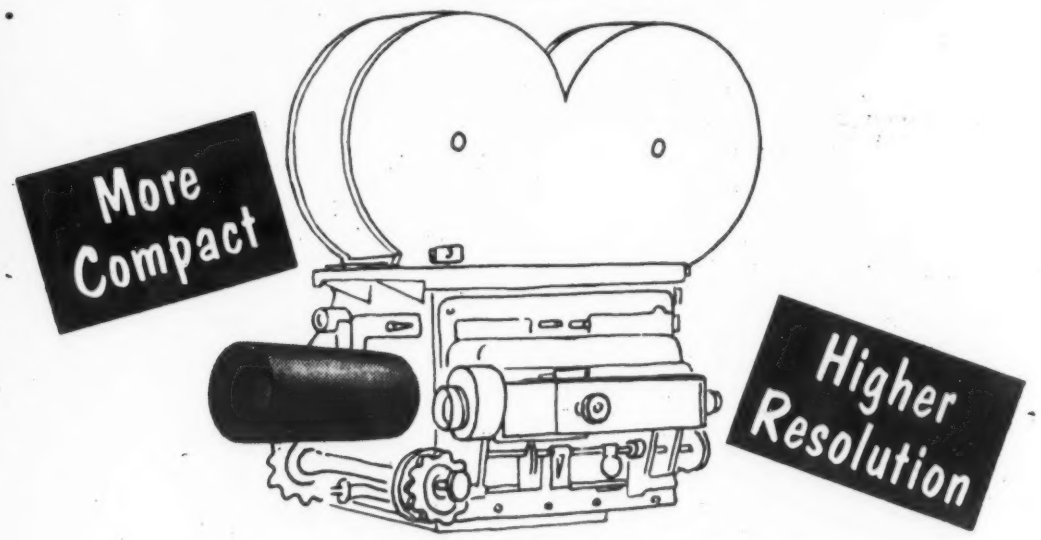
Same house photographed from same point with 18" Wollensak Mirrotel Lens



Same house photographed one mile away with 80" Wollensak Mirrotel Lens



18" f/5.6 MIRROTEL—A telephoto lens for use on 35mm still cameras. An excellent lens for special military purposes, press photographers, nature lovers, architects, police, construction engineers . . . in the theatre or at sporting events. It's a lightweight, compact lens. Easy to use. Delivers excellent definition. Perfect chromatic purity and freedom from any trace of coma or astigmatism.



40" f/8 MIRROTEL, 80" f/14 MIRROTEL—Special purpose telephoto lenses for use on 35mm motion picture cameras make excellent closeups of very distant objects. Five-time enlargement of 80" Mirrotel negative (even infrared exposures) gives as much detail as a direct exposure made with a camera of at least 400" focal length and 5 x 7 image size.

WRITE for more detailed information on Wollensak wonder, Mirrotel Lenses.

Higher Contrast

Wollensak

OPTICAL COMPANY, ROCHESTER 21, N.Y.

The Rankaphone

(*Continued from page* 74)

responding to his own rank. Then science goes into action! Excited electrons and their shadows (holes) race back and forth within the germanium, and in a fraction of a microsecond the oscillator circuit in the exchange fixes on the frequency corresponding to the highest rank of the two parties, and the connection is automatically completed. Conference calls require slightly more germanium, but the principle remains unchanged.

Here now is the crucial and most important part of the invention—

Suppose another party now wishes to converse with either of the two individuals already exchanging words or engaged in soliloquies? When he presses his rank button he automatically informs the WACVAC of his status in the military triangle, and should his rank fall below the highest already in oscillation and currently occupying the line, then a normal busy signal would respond with its usual implication of "patience junior, call later, pipe down," etc.

However, should an officer of superior rank register a desire to make conversation, presto—the WACVAC madly goes into solid state gymnastics, opens up the existing circuit, and the senior officer obtains his party as though the line had never been in prior use.

Impolite, yes—abrupt, yes—but effective and rigidly military!

Before the reader's enthusiasm goes beyond control, however, permit me to introduce one unfortunate feature of the invention, a part which, sadly enough, still has an unsolved aspect.

It is axiomatic in military circles that General and Flag officers are in a special category. It is also commonly recognized that one star is more important than a plurality, since the first comes so hard and is so appreciated when it does arrive. Accordingly, in partial recognition of this fact, in my invention I have only one push button marked "General/Admiral." The WACVAC, however, is a true respector of rank, but in being so it requires the multi-star officer to push the "General/Admiral" button the number of times corresponding to his particular galaxy. Thus two pushes would mean Major General or Rear Admiral, while five would mean General of the Armies or Admiral of the Fleets. Obviously, the five-star rank would soon forget that there ever was such a thing as a busy circuit.

As inferred earlier, however, the invention still has one outstanding weakness, and although an extensive research program is being carried on to correct the fault, it must be admitted that up to now one factor is baffling: in spite of the amazing prowess of the transistor, I have not been able to overcome circuit difficulties pertaining to a special situation which might arise, such as—should five-star rank absent-mindedly miss count on the push button and accidentally signal SIX or MORE?

Regardless of all the ingenuity I have been able to throw at the problem, I find that circuits, when subjected to a six-or-over count invariably consume an excessive wattage for a few microseconds, and then go into audio oscillations remarkably similar to an exotic bag-pipe tune accompained by a type of noise modulation, both well known to overseas Voice of America listeners.

So you can see how close I am to success, but yet how far. Obviously, I could never convince the very top-level in the practicality of my invention, because with accidental six-or-over counts producing the effect indicated, they would think their wire circuit was being jammed—heaven perish the thought—and pity the poor communications officer!

I am not discouraged, however. If I increase the voltage of my effort, perhaps the current solid-state limitations of the transistor can be rectified, or even vice versa. Perhaps an insulator instead of a semi-conductor may be the answer, or one more cats-whisker—or one less. Perhaps, even I can solve the problem with electron tubes—who knows? They too have tremendous potentialities!

**Since this computer will relieve many WACs now serving in telephone exchanges, I have called the master computer the WACVAC in their honor.

• • • — • —

Lightning Protection

(*Continued from page* 20)

Protection of Station Base Equipment

Lightning produces surge currents of many thousands of amperes/sec. If the ground resistance is even a few ohms from one point to another, the potential at the point may be raised to several thousand volts. This might make little difference within the base station if all of the metal parts are connected by a heavy bus to a common ground. In the usual case, the power line enters the building at one point and is grounded. The phone line enters at another point, and is grounded. Still other antennas may be grounded at remote points. Difference in grounded potentials caused by surge currents are of very high voltages. Thus one actually introduces surge currents into each other. These may conduct currents into the radio base station, from lightning strokes some distance away.

It is considered good practice to provide a station ground bus to facilitate the common grounding of such facilities as lightning arresters on the power and communication circuits, the outer conductors of coaxial lines, conduit, equipment cases, gas, and oil lines, plumbing and metallic members of the building structure. Connection to the power system primary ground should be discussed with the local power people to be sure that it does not produce an undesirable fault-current condition.

To protect base station equipment against surges brought into the station over the power lines, low-voltages protection should be applied to the secondary distribution power circuits 110/220.

One form of low voltage protection is made by bridging a Western Electric 0-159235 silicon carbide varistor or equivalent in series with 700 volts protector blocks (.006 inch gap) across the 110 volt power circuit feeding the communication equipment. This protective equipment should be mounted in the racks.

To reduce protector block operation, and prevent flashover of the varistor on heavy strokes, a General Electric 9L"15A4 or Westinghouse type AO protector is connected across the secondary at the service entrance.

This low-voltage protection is also helpful in reducing lightning damage to aircraft warning lights on antenna towers.

Various other means of protection will be required in special locations and installations.

REFERENCES:

1. National Electric Code Pamphlet #78
2. Code for Protection against Lightning NBS Handbook #40
3. National Fire Protection Association NFPA #78
4. American Standards Association A SAC 5
5. American Institute of Electrical Engineers AIEE Report

• • • — • —

klystrons

AT WORK IN THE LABORATORY

Sperry Klystron tubes are doing heavy duty in the labs where a practical source of continuous microwave energy is needed for general test and measuring work. A complete line of 2K tubes is available for bench oscillator use from 2660 to 10,300 mc.

Stemming from its sponsorship of the development of the klystron in 1939, Sperry has had many years' experience in the manufacture of these tubes. Besides the 2K-series for laboratory use, other Sperry Klystrons include transmitting tubes for microwave relays, radars (both pulsed and cw), radar beacons, aeronautical navigation (DME and ILS), and radio communication systems. Other Sperry Klystrons are used as local oscillators in radar and microwave communication receivers. Klystron multiplier tubes are used in frequency standards and for other applications where crystal control at microwave frequencies is desired.

Sperry's pioneering in microwave measuring techniques has resulted in a complete line of Microline* instruments which includes every type of device essential to precision measurement, in the entire microwave field.

Our Special Electronics Department will be happy to supply you with complete details on Klystrons and Microline equipment.

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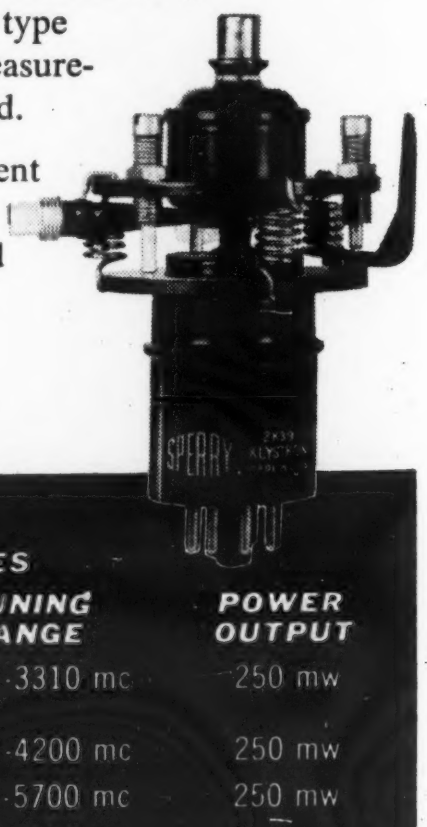

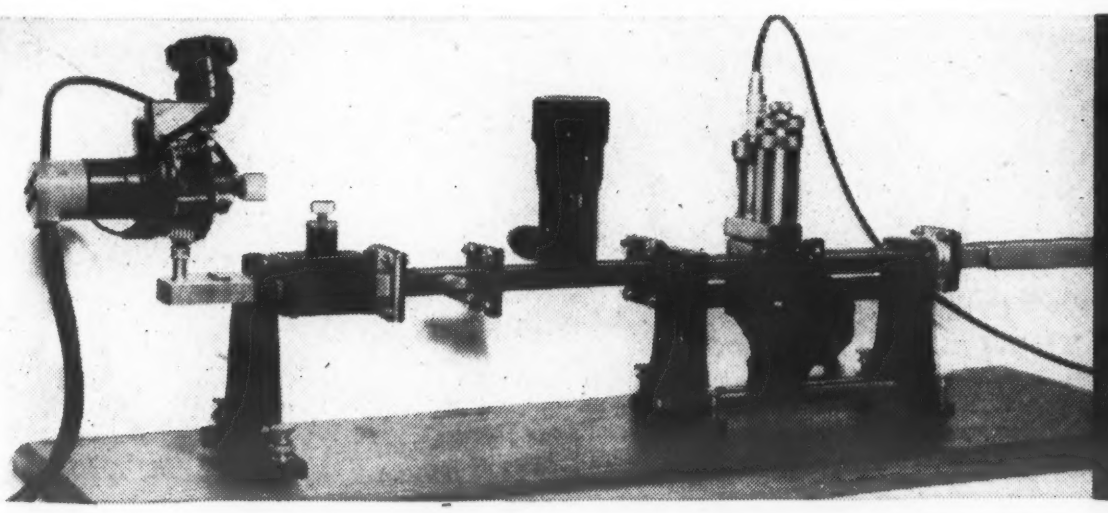

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2K 43	4200 -5700 mc	250 mw
2K 44	5700 -7500 mc	250 mw
2K 39	7500 -10,300 mc	250 mw

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PHOTOGRAPHY, ITS MATERIAL AND PROCESSES. By C. B. Neblette, D. Van Nostrand Company, Inc. 490 pgs. $10.00.

For 25 years, through many revisions, Neblett's "Photography" has been an outstanding reference work in photographic Technology. This new edition, completely rewritten, redesigned and reset, contains the most recent material available. Assisting the author in its writing have been fourteen specialists from the Department of Photographic Technology at the Rochester Institute of Technology, the Kodak Research Laboratories, the Eastman Kodak Company, the Ilex Optical Company and Pavelle Color Laboratories.

It is a comprehensive practical handbook covering every aspect of photographic technology from optical theory to the chemistry of the negative and print, including full information about the newest color processes.

Among the subjects covered in the 33 chapters are the optics of photography, lenses, shutters, and filters, photochemistry, emulsions and color sensitizing; the latest theories of exposure and development, sensitiometry and tone reproduction; the new diffusion-transfer processes, and five chapters on modern color processes including a chapter on the accuracy of color reproduction. The students of photography and photographic workers, amateur or professional, will find this book with its broad coverage of the materials and processes of modern photography most complete.

THE DESIGN OF SWITCHING CIRCUITS. By William Keister, Alistair E. Ritchie, Seth H. Washburn Van Nostrand Company, Inc. 546 pgs.

This book, is one of a series arising out of the broad investigations of the Bell Telephone Laboratories, a research and development organization whose more than 5,000 members deal with every aspect of communications and allied fields. For more than twenty years the series has represented some of the most notable contributions to the literature of science and engineering.

The Design Of Switching Circuits presents the basic techniques of switching circuit design-control techniques which are applicable to simple control circuits as well as to telephone switching systems, digital computers, and other large control systems. These techniques extend today throughout a wide range of applications in science and technology, in business and in industry—where switching circuits are used to perform a variety of complicated control actions and mathematical calculations. The book covers specifically the methods of using interconnected two-valued devices, primarily electromagnetic relays, in systems for automatic control. The treatment includes a brief description of circuit components; fundamental principles of relay contact network design, including switching (Boolean) algebra; design of basic circuits to perform specific functions such as counting, memory, translating, lookout, and selecting; and the integration of such functional circuits into systems. Also included is the application of switching algebra to electronic circuit design. The techniques are applicable to the design of digital computers, automatic telephone switching systems, and other systems where response is a function of the combination and sequence of discrete input conditions. The approach is based upon the logical interrelation of closed or open circuit paths rather than upon electric circuit theory.

More than 400 illustrations of circuits, of time and sequence charts and of many other topics clarify the treatment. Many problems demonstrate the important phase of circuit design.

FUNDAMENTALS OF RADIO COMMUNICATIONS. By Abraham Sheingold, D. Van Nostrand Co., Inc., 430 pgs. $5.25.

The purpose of this book is to present, in sufficiently comprehensive form for basic understanding, the principles and techniques employed in modern radio-communications systems. The text material has been carefully selected toward the end of familiarizing the student with the general methods, capabilities and limitations of radio communications; with the important characteristics of the basic components and circuits used in radio equipment; and with the operational features of such radio systems as a-m and f-m sound-communications systems, television, facsimile, multiplex systems, radar and loran.

The subject matter has been presented at an intermediate level suitable for students who do not have an extensive background in mathematics or electricity. The maintenance of this level has imposed no serious limitation upon the thoroughness with which the basic circuit theory has been presented. Those circuits whose characteristics can be developed quantitatively have been so treated and, in general a sufficient amount of mathematical analysis has been included to develop in the student an appreciation of the analytical techniques available for the solution of radio-circuit problems, thus, the RC-coupled voltage amplifier has been analyzed in a detailed quantitive fashion, and this treatment is intended to serve as a general illustration of the methods of attack commonly utilized in amplifier circuit analysis. Throughout the book, a special effort has been made to secure a logical arrangement of topics and presentations of concepts that would lead both to a coordinated coverage of the subject on the intended level to the provision of a suitable background for whatever further studies the subject the student may contemplate.

HOW TO MAKE MONEY WITH YOUR CAMERA. By Harrison Forman, McGraw Hill.

There are thirty million camera users in America. Of these, an impressive number are convinced they can make a picture every bit as good as the best one that has ever been sold.

And many of them can!

The problem, however, is how and where to sell that picture. How To Make Money With Your Camera endeavors to tell you what sells, who buys, what some editors want, and what others don't want. It tells where to sell pictures of dogs, babies, of

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train wrecks, of shop windows, or of a celebrity. It tells you what markets are best for a sequence on how to make a cherry pie, how to give Junior a haircut, and how to fish if you don't know how.

You don't have to travel to Tibet or Timbuktu to get saleable pix. There is a photographic gold mine right in your own back yard. The pictures that get the biggest play today are those of ordinary people doing ordinary things in ordinary surroundings, pictures which you, too, can shoot with a little enterprise and initiative, skill and imagination.

Sixteen pages of illustrations, many of them specially chosen by editors from their own files of photographs purchased from amateurs, highlight the qualities that make a saleable picture. Pionters are given on writing captions, obtaining releases on personal pictures for commercial use and writing letters to accompany submitted photographs. A survey of various types of cameras describes their function and performance.

To help you sell the right pictures in the right places, How To Make Money With Your Camera carries a special Photo Market Guide with more than 300 listings. Each listing has been written and checked by the editor of the publication, who tells you exactly the kind of pictures he wants and how much he will pay for them. A handy index cross-files these listings by subjects.

The author is a well-known free lance photographer who makes money with his camera. For over twenty years he has traveled throughout the world taking pictures which have appeared in major publications in the United States, Canada, Europe, and South America. His helpful advice and suggestions, his anecdotes out of his own wide personal experience make this an entertaining as well as a useful book for anyone who wants to make money with his camera.

ADVANCED ANTENNA THEORY. By Sergei A. Schelkunoff. Wiley, 216 pgs. $6.50.

. . . . . presents in rigorous fashion the theory behind antenna behavior and broad band antenna design. Devoted to recent, important work in advance antenna theory, this book serves as an excellent review of current trends in antenna research and development.

Dr. Schelkunoff divides his material into six sections; Spherical Waves, Mode Theory of Antennas, Spheroidal Antennas, Integral Equations, Cylindrical Antennas, and Natural Oscillations. The author gives a compact comprehensive explanation of Hallen's method of obtaining asymptotic solutions for thin antennas, Stratton and Chu's solution for speroidal antennas, and the author's own theory of conical antennas and thin antennas of arbitrary shape.

Advanced Antenna Theory contains much hitherto unpublished material. Stressing physical interpretations of the mathematical methods employed, the author emphasizes the method based on spherical wave functions because it is applicable to many problems and because it has a particularly simple physical significance.

Address all inquiries regarding books and general services to department manager.

Insignia of the Association

AVAILABLE TO MEMBERS FROM THE SERVICE DEPARTMENT

The association insignia in several beautiful designs and convenient styles authorized for wear by members is availabl at the prices quoted below. Order from AFCA Service Department, 1624 Eye St., N. W., Washington 6, D. C. The insignia is described as follows: The central figure is an alert powerful American eagle with strong talons clutching lightning flashes—symbolic of a strong America and national defense—especially insofar as modern communications is concerned. The border consists of leaves of the olive branch of peace, indicating that the object of preparedness in America is to assure a lasting peace. In the background are signal flags—the first means of signalling in sea and land warfare. Above the eagle and between his outstretched wings is a bomber in flight, symbolizing the complicated and essential communications. Above that is a radar antenna array, and at the very top a radio relay antenna —for the latest major step in communications.

Members should take every opportunity to display AFCA insignia. Worn on the uniform or civilian dress, or displayed on home or office wall, it carries with it an identification of distinction, is decorative, and helps to widen the scope of our Association by bringing it to the attention of others. Emblem is available in a variety of attractive forms.

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Lewyt

(*Continued from page* 35)

within a half day. It enables the production department to lengthen the assembly line on the product which may be falling behind schedule or to set up in a very short time, an assembly line for a new product ready for a short run.

This same flexible approach is also used in the testing and trouble shooting of electronic equipment. The copperclad test cages in which the transmitters and receivers are aligned, tested, and troubles corrected are on wheels so that they can be moved to another part of the plant to become test cables for a completely different type of electronic equipment. Too, they can be easily disassembled and stored if more production space is needed.

Another characteristic of the Lewyt production effort that typifies the "family" feeling throughout the plant is the company's attempt to perform as many of its operations as possible with disabled veterans. This policy has worked out quite well for both Lewyt and the veterans making for an extremely stable and contented working force.

At the outbreak of the Korean War, Lewyt Corporation was given a contract for urgently needed AN/GRC-9 field communications receivers. The production engineers set up schedules to meet the needs of the Armed Forces. By September 1950, production had increased 1000% over March, a period of six months, and, by March 1951, production had increased 2000%. Lewyt met the challenge, was ready for scheduled deliveries and met the emergency with the equipment being available when it was to be flown to Pusan.

The Lewyt Mobilization Plan

Alex Lewyt, recognizing the danger present in massed Soviet and Soviet Satellite Armies, organized a distribution network for his vacuum cleaner throughout the country, which could readily be converted to work for the defense of our country. A two fold plan was developed; one, the distributors could be expediters of material; and, two, they would be sub-assembly lines. They are dispersed in accordance with the strategic policy of our military planners for decentralized production. As expediters, they assist in prodding the suppliers to Lewyt in their area and speed up the supplier to meet his delivery schedule. And as sub-assembly lines, it is interesting to know that these distributors have productive facilities estimated at more than 5 million square feet and a possible pool of 5 thousand skilled and semi-skilled employees that can be quickly added to Lewyt in a period of total mobilization these Lewyt distributors are organized to place their combined capacity into the Lewyt Corporation in any all-out effort. From the point of view of the distributors the basic factor is that with this Lewyt Mobilization Plan they will be able to remain in business regardless of what the uncertain future may offer.

And this is the Lewyt story—a story of a corporation living in a democracy—working for its people, and with its people, in an effort to maintain freedom in a country we all love!

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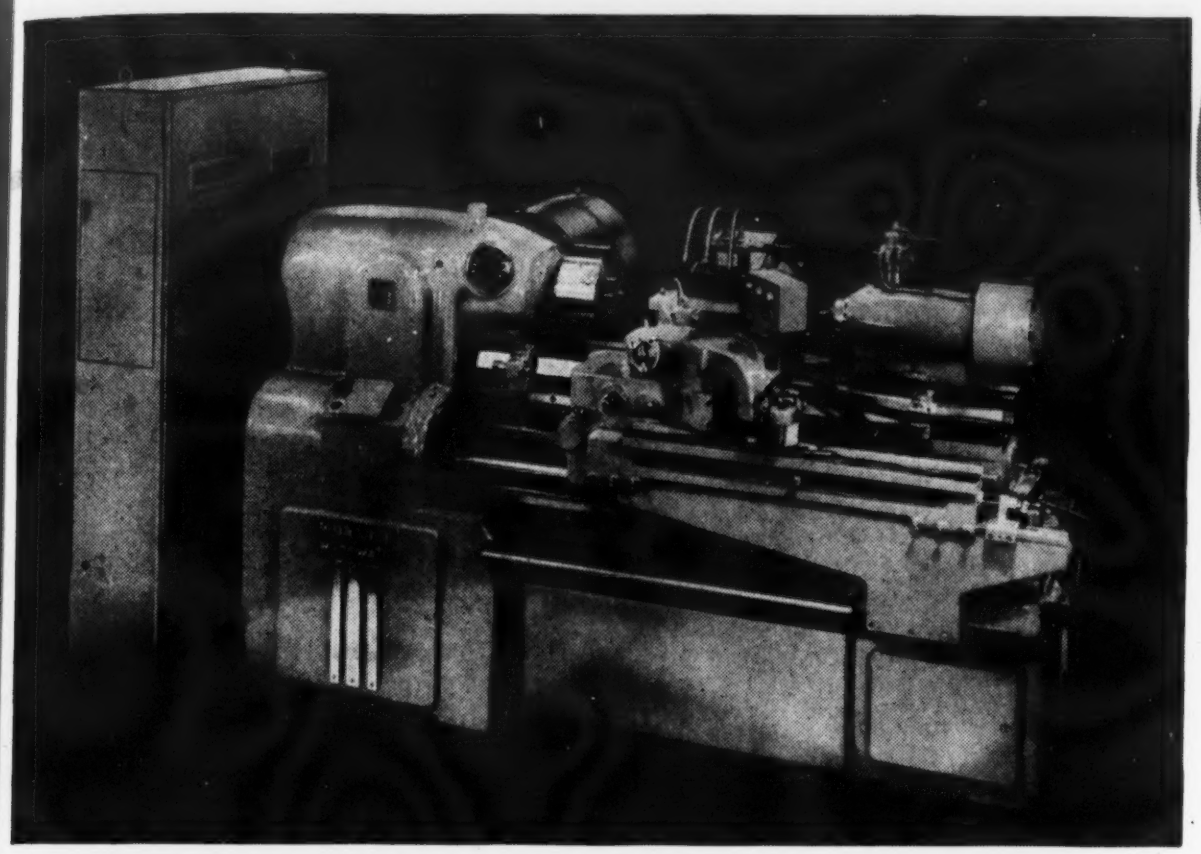

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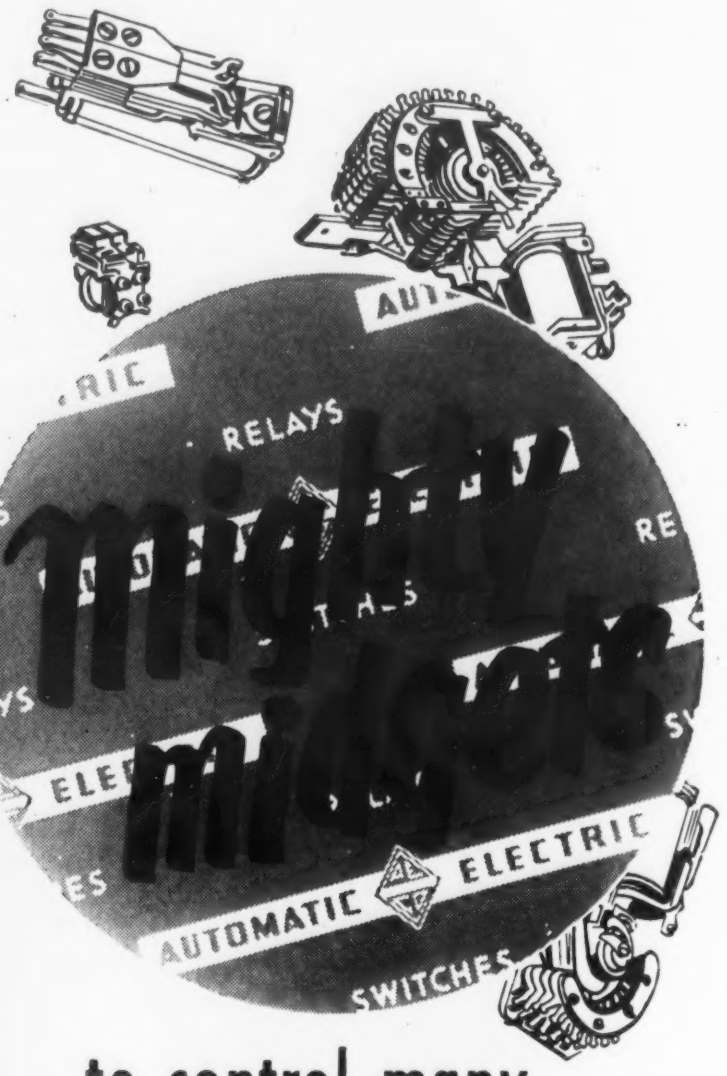

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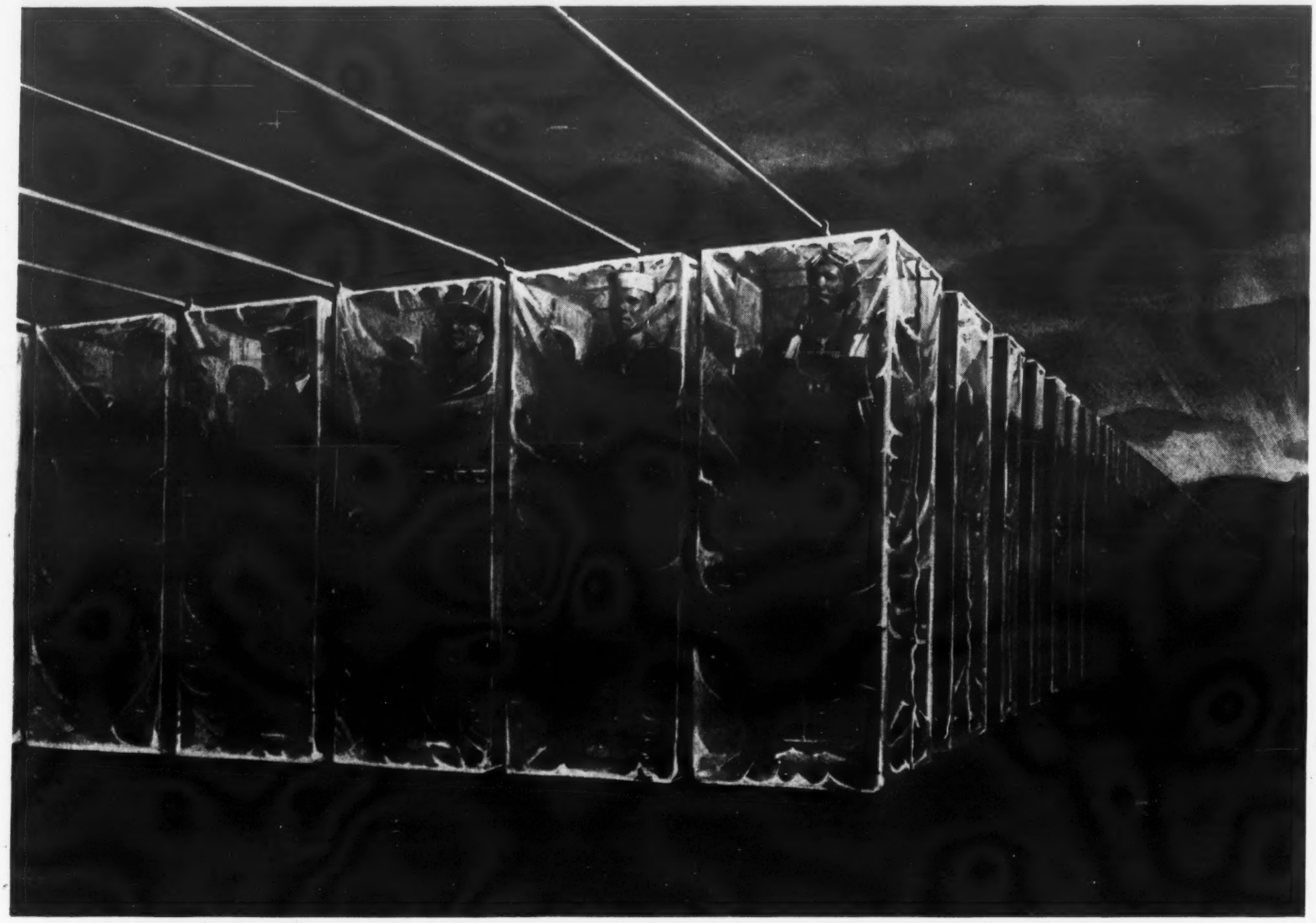

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